PHOTOFACT* FOLDER SET

*TRADE MARK

NO. 80

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PHOTOFACT* Folder

ARTONE MODEL AR-23TV-1

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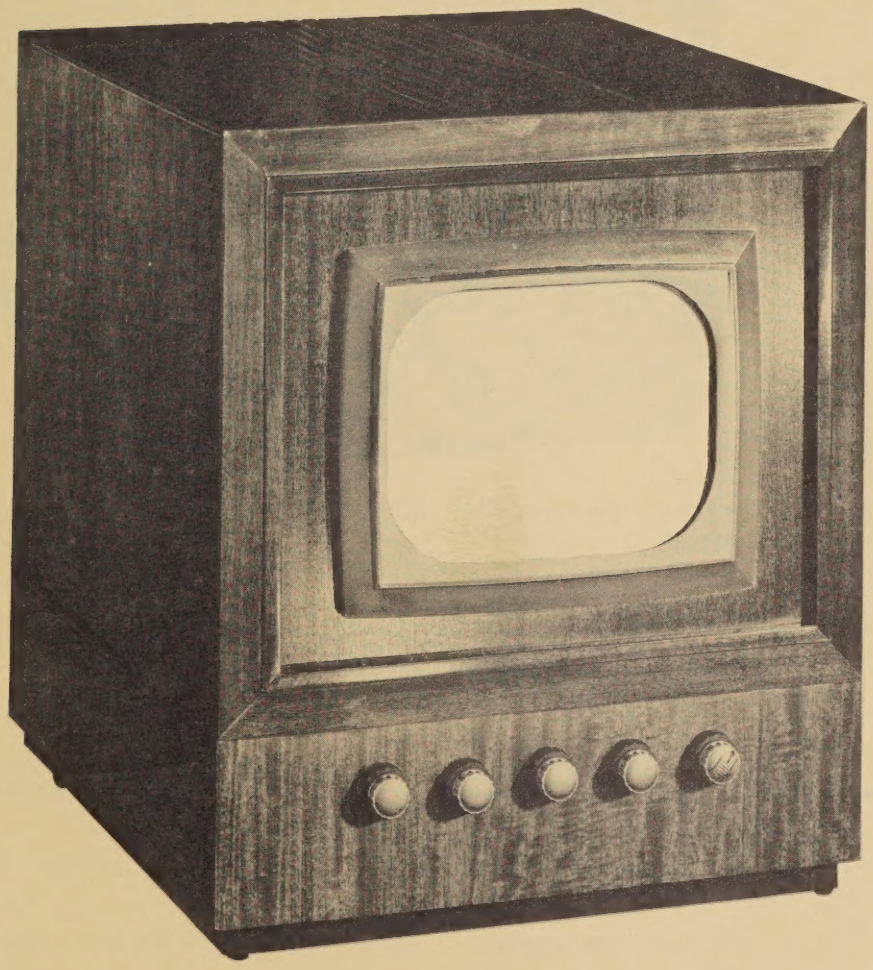

ARTONE MODEL AR-23TV-1

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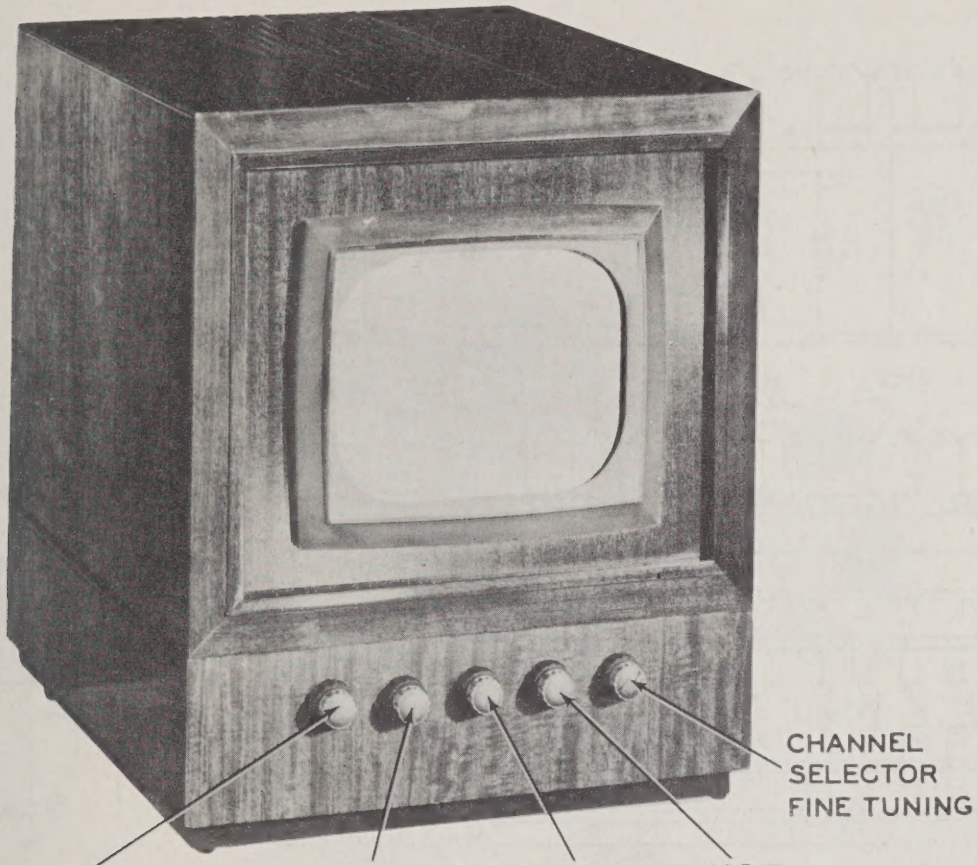
ARTONE
MODEL AR-23TV-1



ARTONE
MODEL AR-23TV-1

TRADE NAME Artone, Model AR-23TV-1
SUPPLIER Affiliated Retailers, Inc., Empire State Bldg., New York (1), N.Y.
TYPE SET Television Receiver
TUBES Twenty-Three

POWER SUPPLY 105-125 Volts, 60 Cycles AC RATING: 1.8 Amps @ 117 Volts
TUNING RANGE—Channels 2 through 13

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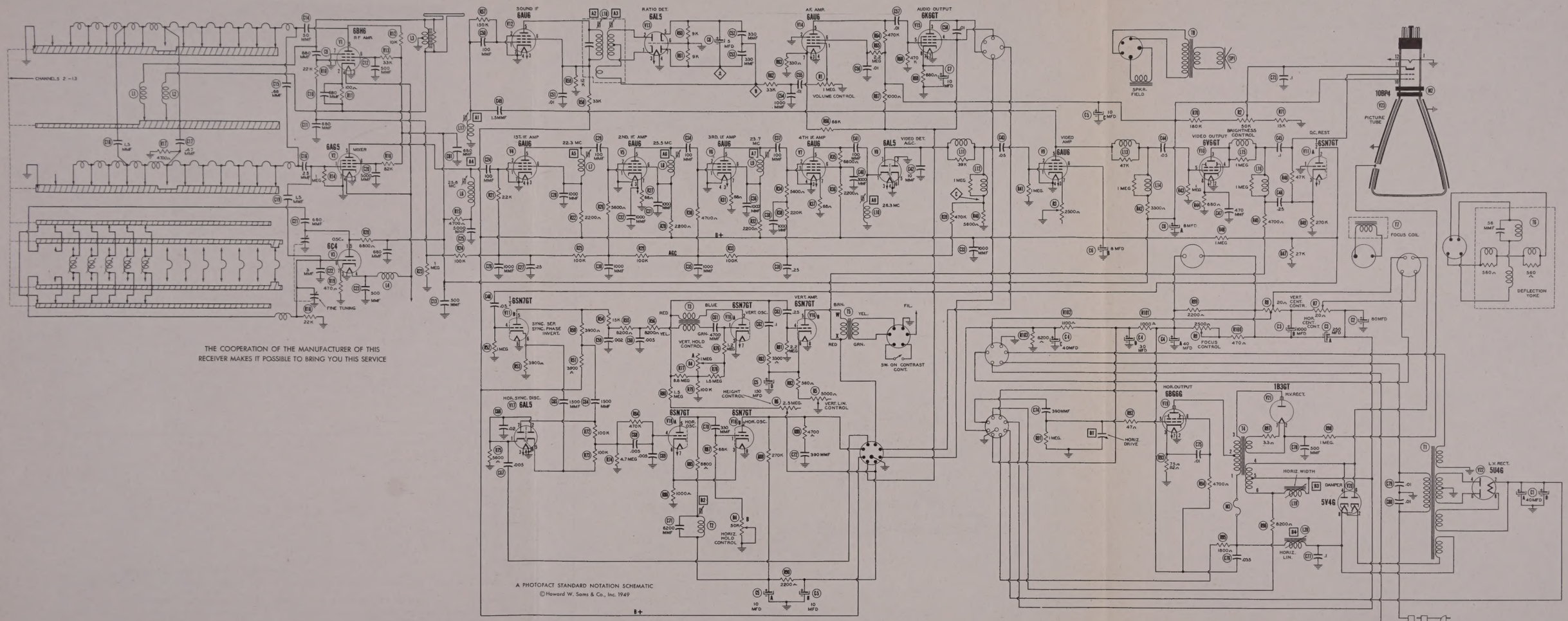
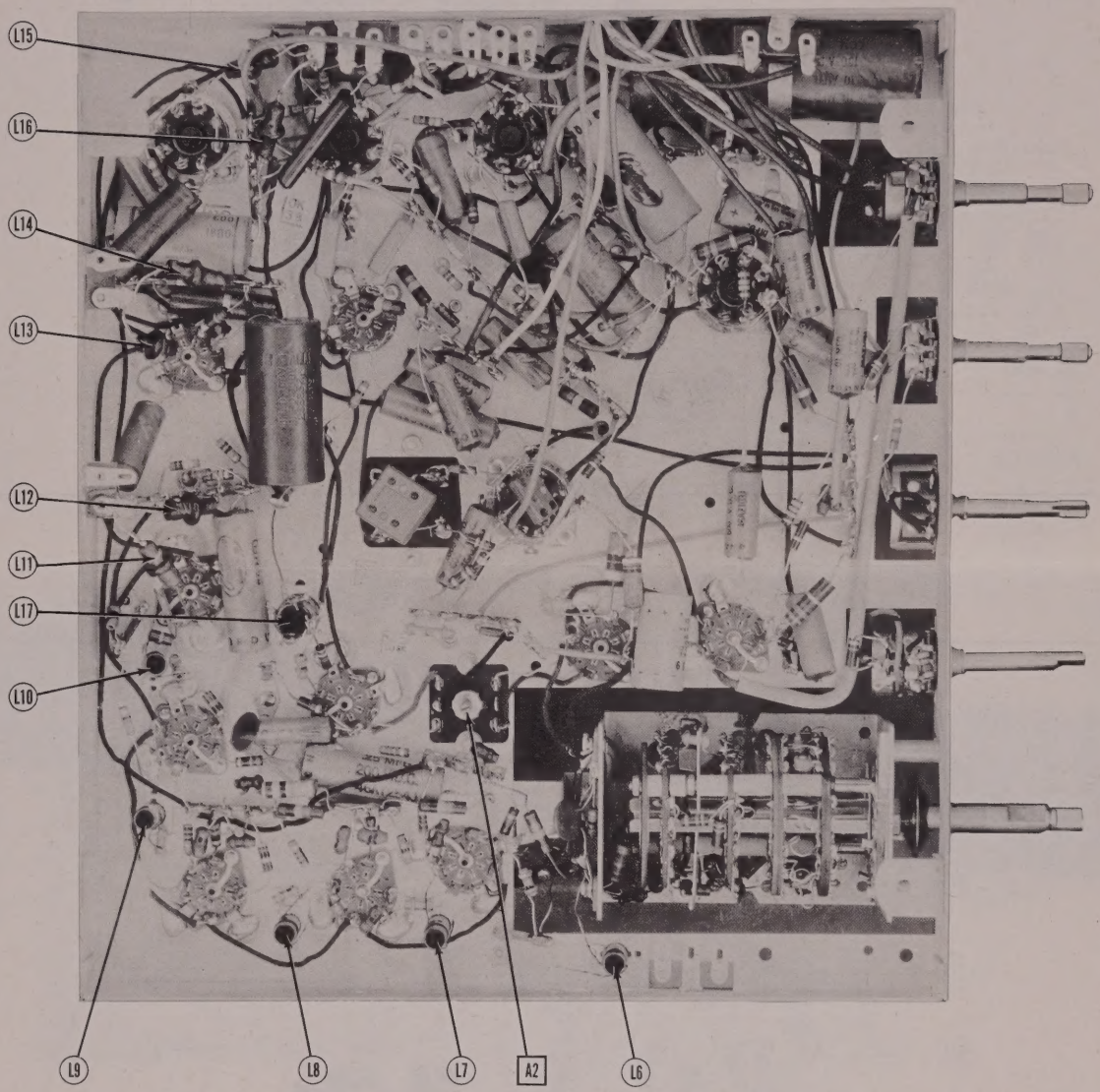
DATE 12/49 SET #80 FOLDER #1



ARTONE
MODEL AR-23TV-1



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

SOUND ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	5000MMF	High side to pin 1 (Grid) 6AU6 (V9). Low side to chassis.	4.5 MC (Unmod)	Any	DC Probe to pin 7 6AL5 (V13) Point (A) Common lead to chassis.	A1, A2	Adjust for maximum deflection. Attenuate signal generator to give approximately 1 volt reading on VTVM.
2.	5000MMF	"	"	"	DC Probe to point (B) Common to chassis.	A3	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

Shift the frequency of the signal generator either side of 4.5MC and slightly readjust A2 for approximately equal peaks. For best results, use only enough signal generator output to give one volt peaks. Retouch A3 for null point.

IF AMPLIFIER ALIGNMENT

Remove oscillator tube V3 (6C4) before aligning the IF coils to prevent any possible spurious beats which might give improper alignment.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3.	Two 150Ω carbon res.	Insert resistor in each generator lead and connect across antenna terminals.	25.8MC 22.3MC 25.5MC 23.7MC 26.3MC	2 " " " "	DC Probe to point (C) Common to chassis.	A4 A5 A6 A7 A8	Adjust the five IF Coils at their listed frequencies for maximum deflection keeping signal generator level at such a point to maintain approximately a two volt reading on VTVM.

Tune the signal generator from 21MC thru 26.25MC, attenuated to give a 1 1/2 volt reading on VTVM at the peaks. Plot IF response curve. Check readings at 21.75MC, 26.25MC and the dip between peaks. See figure 1 for correct response curve.

OVERALL IF RESPONSE CHECK USING SWEEP GENERATOR AND OSCILLOSCOPE

Connect synchronized sweep voltage from signal generator to horizontal amplifier in scope to obtain horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	5000MMF	High side to pin 1 (Grid) 6AG5 (V2). Low side to chassis	24MC (10MC Sweep)	21.75MC 26.25MC	2	Vert. Amp. to point (C) Low side to chassis.		If necessary, slightly retouch A4, A5, A6, A7, and A8 to obtain pattern similar to Fig 1. Check to see that markers fall at proper points.

OSCILLATOR ALIGNMENT

The RF and Mixer lines of the tuner are very stable and pre-set at the factory, and normally do not require adjustment in the field. They may be touched up, however, by compressing or expanding the coils as required to bring up the overall gain.

The local oscillator operates 24.5MC above the center frequency of each TV Channel. To set the local oscillator, a seperate "BFO" generator set at 24.5MC is used to obtain a zero beat with this difference frequency. Couple the "BFO" generator to the receiver by means of a few turns of hookup wire coiled around the 6AL5 video detector tube (V8). Connect a .01mfd. capacitor between point (D) on the schematic and pin 1 of the 6AU6 audio amplifier tube (V14). Turn the fine tuning control to the midpoint of its range and set the channel selector switch to the channel which is to be aligned. (The oscillator circuits of each channel are independent of each other and therefore only those channels requiring alignment need be adjusted.)

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BFO GENERATOR FREQUENCY	CHANNEL		ADJUST	REMARKS
5.	Two 150Ω res.	Insert resistor in each lead of signal generator and connect across the antenna input.	57MC 63MC 69MC 79MC 85MC 177MC 183MC 189MC 195MC 201MC 207MC 213MC	24.5MC " " " " " " " " " " "	2 3 4 5 6 7 8 9 10 11 12 13		A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20	Adjust slugs or shift the coil turns for rough audio beat in the speaker.

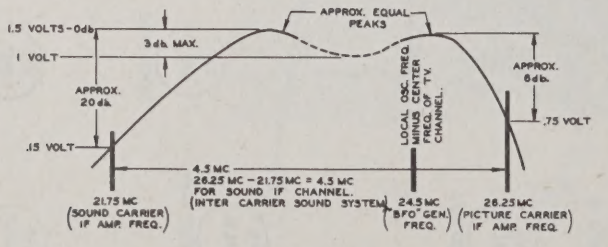
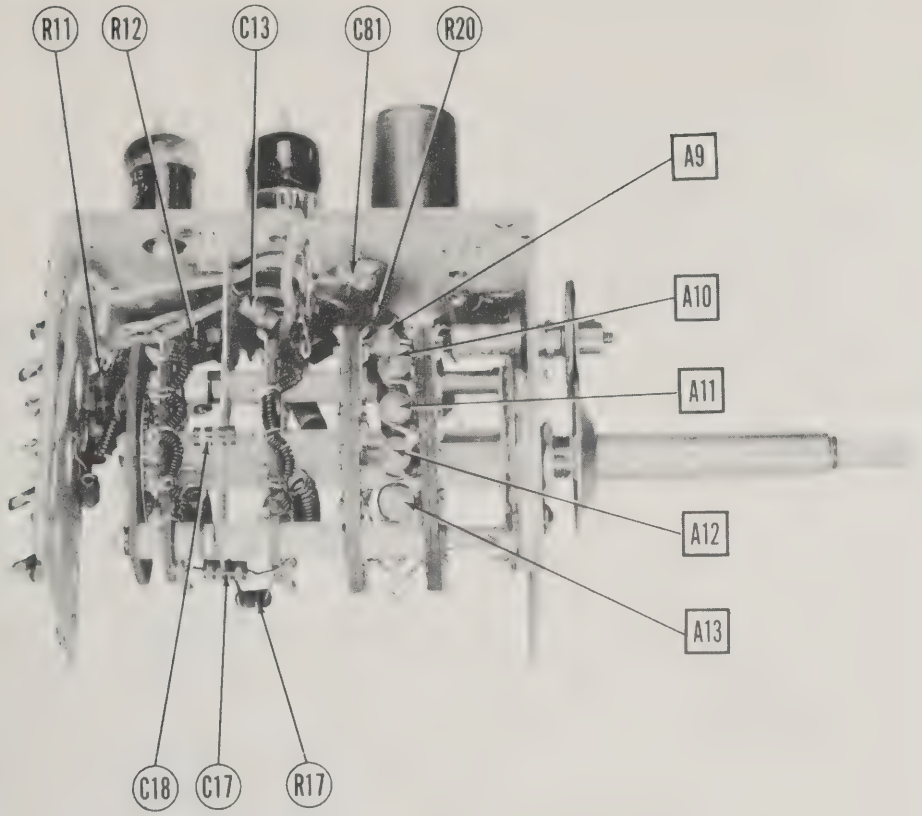
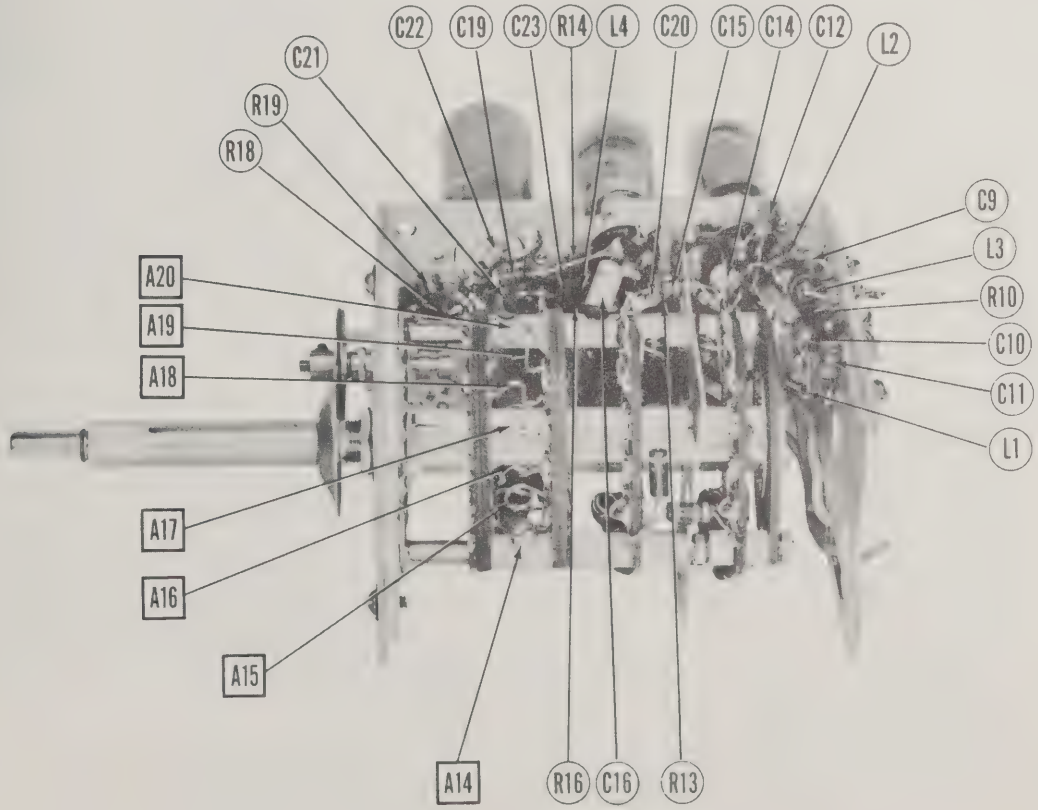

1.5 VOLTS-0db
1 VOLT
.15 VOLT
3db MAX.
APPROX. EQUAL PEAKS
APPROX. 20db
APPROX. 6db
.75 VOLT
LOCAL OSC. FREQ. MINUS CENTER FREQ. OF T.V. CHANNEL.
4.5 MC
26.25 MC - 21.75 MC = 4.5 MC FOR SOUND IF CHANNEL. (INTER CARRIER SOUND SYSTEM)
21.75 MC (SOUND CARRIER IF AMP. FREQ.)
24.5 MC BFO GEN. FREQ.
26.25 MC (PICTURE CARRIER IF AMP. FREQ.)

FIG. 1



RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	-.3VDC	.7VDC	0V	6.3VAC	150VDC	130VDC	0V		
V 2	6AG5	-.3VDC	0V	0V	6.3VAC	180VDC	115VDC	0V		
V 3	6C4	150VDC	0V	0V	6.3VAC	150VDC	§-.6VDC	4.1VDC		
V 4	6AU6	-.6VDC	0V	6.3VAC	0V	120VDC	120VDC	0V		
V 5	6AU6	-.4VDC	0V	6.3VAC	0V	120VDC	120VDC	.6VDC		
V 6	6AU6	-.4VDC	0V	6.3VAC	0V	120VDC	120VDC	.6VDC		
V 7	6AU6	-.3VDC	0V	6.3VAC	0V	110VDC	120VDC	.6VDC		
V 8	6AL5	0V	0V	6.3VAC	0V	0V	0V	-.7VDC		
V 9	6AU6	0V	0V	6.3VAC	0V	195VDC	145VDC	4VDC		
V 10	6V6GT	0V	0V	230VDC	230VDC	0V	0V	6.3VAC	14VDC	
V 11	6SN7GT	0V	16.5VDC	1.2VDC	0V	130VDC	5.5VDC	6.3VAC	0V	
V 12	6AU6	-.4VDC	0V	6.3VAC	0V	28VDC	28VDC	0V		
V 13	6AL5	-.1VDC	.1VDC	6.3VAC	0V	.6VDC	0V	-.6VDC		
V 14	6AU6	0V	0V	6.3VAC	0V	100VDC	35VDC	1.2VDC		
V 15	6K6GT	0V	0V	210VDC	217VDC	0V	0V	6.3VAC	15VDC	
V 16	6SN7GT	-8.3VDC	60VDC 125VDC	0V	0V	320VDC	5VDC 17VDC	6.3VAC	0V	
V 17	6AL5	0V	0V	6.3VAC	0V	1.2VDC	0V	-.6VDC		
V 18	6SN7GT	-7.4VDC	165VDC	13VDC	.1VDC	360VDC	13VDC	6.3VAC	0V	
V 19	6BG6G	0V	0V	6VDC	0V	-1.1VDC	0V	6.3VAC	260VDC	TOP CAP *
V 20	5V4G	0V	450VDC	0V	370VDC	0V	370VDC	0V	450VDC	
V 21	1B3GT	* DO NOT MEASURE								
V 22	5U4G	0V	380VDC	0V	370VAC	0V	370VAC	0V	380VDC	
V 23	10BP4	0V	.9VDC	PIN 10 200VDC	PIN 11 50VDC	PIN 12 6.3VAC				

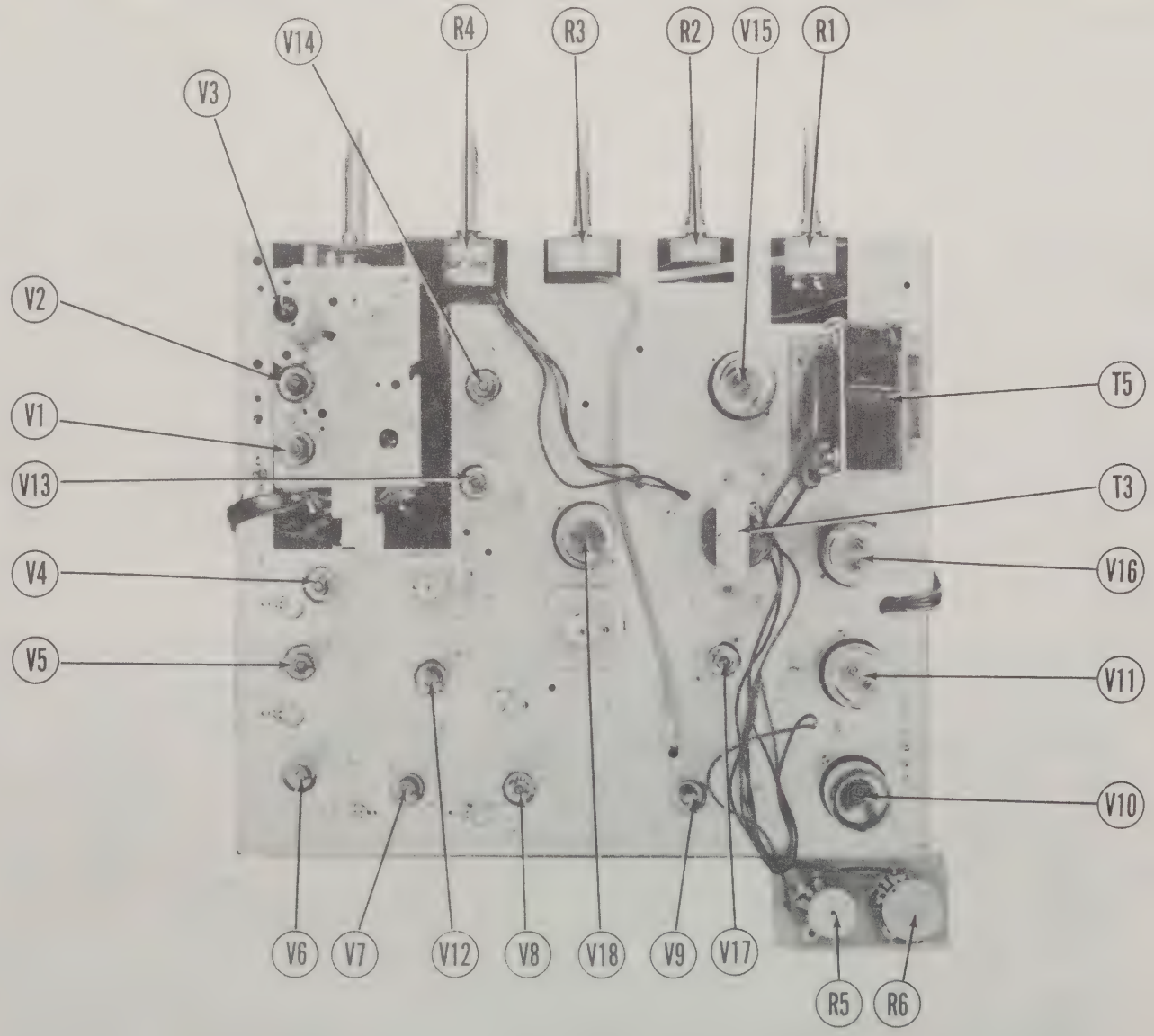
* Do not measure
§ Taken with vacuum tube voltmeter.

RESISTANCE READINGS

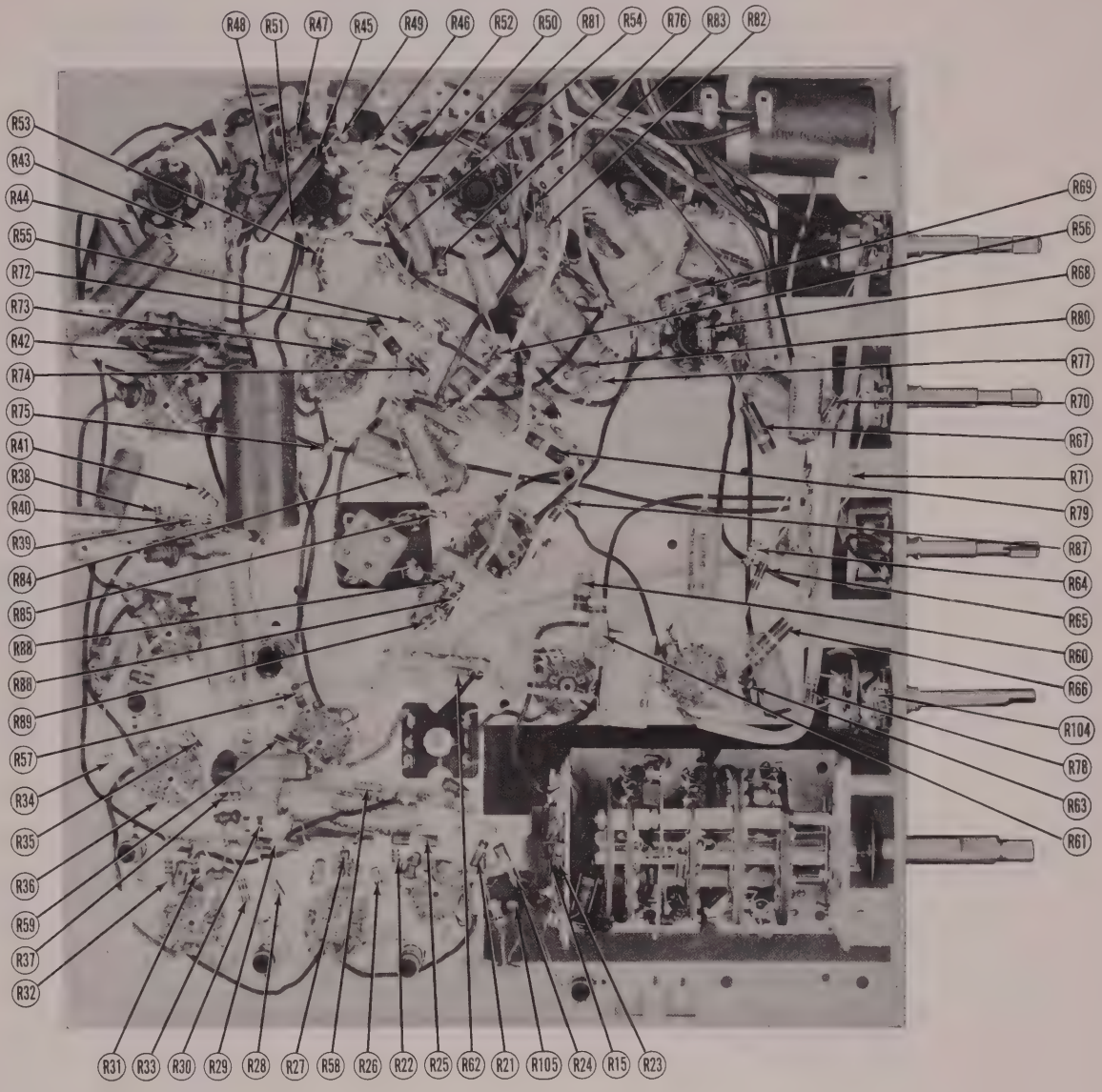
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	500KΩ	100Ω	0Ω	.1Ω	†13KΩ	†39KΩ	0Ω		
V 2	6AG5	1 Meg.	0Ω	0Ω	.1Ω	†6.5KΩ	†85KΩ	0Ω		
V 3	6C4	†8KΩ	Inf.	0Ω	.1Ω	†8KΩ	22KΩ	470Ω		
V 4	6AU6	470KΩ	0Ω	.1Ω	0Ω	†4KΩ	†4KΩ	0Ω		
V 5	6AU6	440KΩ	0Ω	.1Ω	0Ω	†4KΩ	†4KΩ	68Ω		
V 6	6AU6	400KΩ	0Ω	.1Ω	0Ω	†4KΩ	†4KΩ	68Ω		
V 7	6AU6	550KΩ	0Ω	.1Ω	0Ω	†11KΩ	†4KΩ	68Ω		
V 8	6AL5	0Ω	0Ω	.1Ω	0Ω	Inf.	0Ω	6KΩ		
V 9	6AU6	1 Meg.	0Ω	.1Ω	0Ω	†5KΩ	†2KΩ	2.3KΩ		
V 10	6V6GT	Inf.	0Ω	†4.8KΩ	†4.8KΩ	1 Meg.	Inf.	.1Ω	680Ω	
V 11	6SN7GT	0Ω	†32KΩ	270KΩ	1 Meg.	†10KΩ	3.9KΩ	.1Ω	0Ω	
V 12	6AU6	150KΩ	0Ω	.1Ω	0Ω	†13KΩ	†13KΩ	0Ω		
V 13	6AL5	Inf.	Inf.	.1Ω	0Ω	9KΩ	0Ω	9KΩ		
V 14	6AU6	12.5Ω	0Ω	.1Ω	0Ω	†470KΩ	†2.2Meg.	330Ω		
V 15	6K6GT	Inf.	0Ω	†1.5KΩ	†1.2KΩ	470KΩ	Inf.	.1Ω	680Ω	
V 16	6SN7GT	1.5 Meg.	†2.7Meg. †1.5Meg.	0Ω	2.2 Meg.	†900Ω	4.5KΩ 500Ω	.1Ω	0Ω	
V 17	6AL5	5.6KΩ	5.6KΩ	.1Ω	0Ω	5 Meg.	0Ω	5 Meg.		
V 18	6SN7GT	100KΩ	♦270KΩ	1000Ω	5 Meg.	♦9KΩ	1000Ω	.1Ω	0Ω	
V 19	6BG6G	Inf.	0Ω	75Ω	Inf.	1 Meg.	Inf.	.1Ω	†5KΩ	TOP CAP ♦220Ω
V 20	5V4G	Inf.	370KΩ	Inf.	†650Ω	Inf.	†650Ω	Inf.	370KΩ	
V 21	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ♦400Ω
V 22	5U4G	Inf.	8KΩ	Inf.	32Ω	Inf.	30Ω	Inf.	8KΩ	
V 23	10BP4	0Ω	320KΩ	PIN 10 †2KΩ	PIN 11 50KΩ	PIN 12 .1Ω				

† Measured from pin 2 of V22
♦ Measured from pin 8 of V20

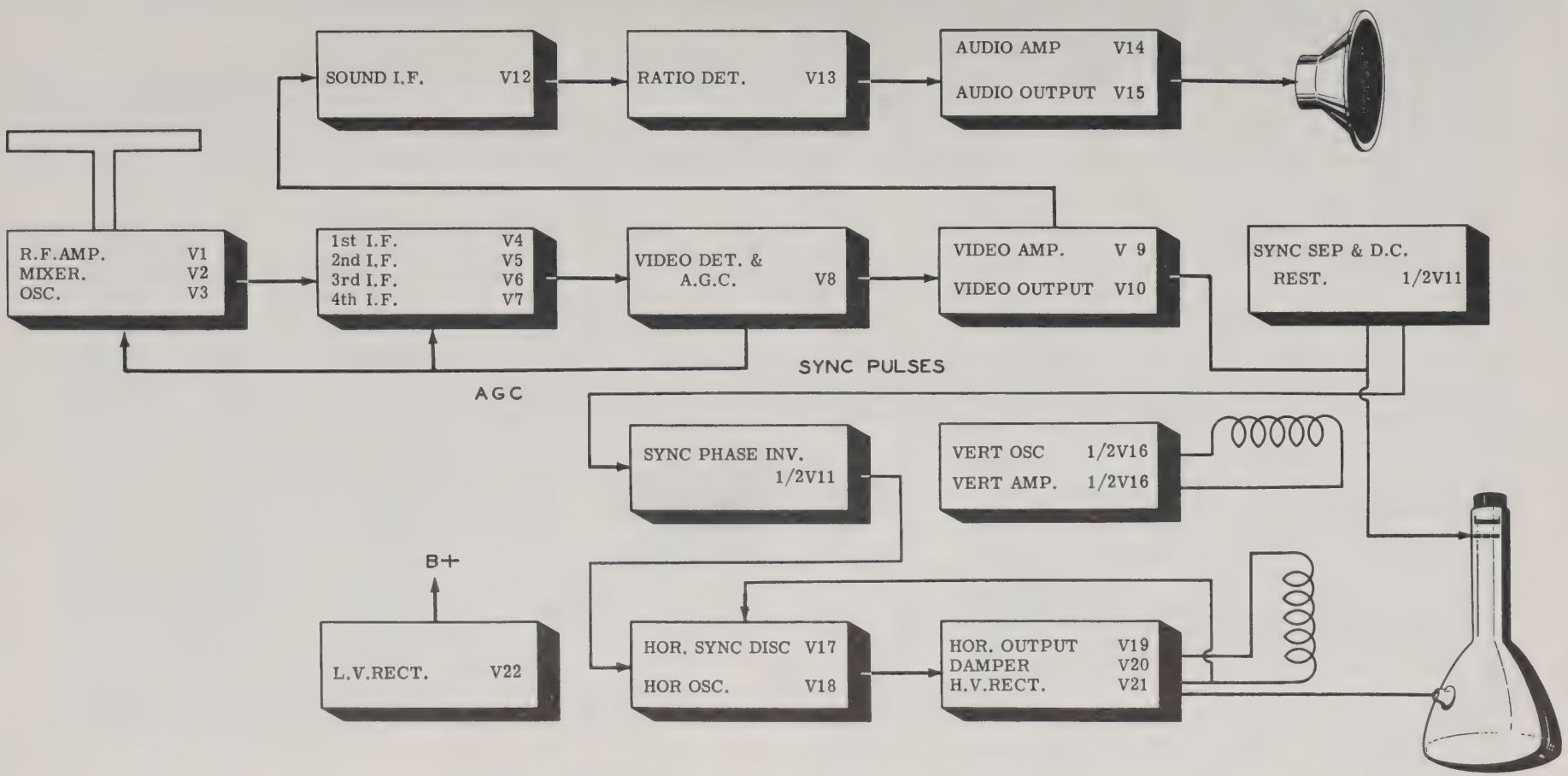
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



CHASSIS-TOP VIEW



CHASSIS BOTTOM VIEW- RESISTOR IDENTIFICATION



BLOCK DIAGRAM

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.		6BH6	7CM	
V2	Mixer		6AU6	7BD	
V3	Oscillator		6C4	6BG	
V4	1st Video IF Amp		6AU6	7BK	
V5	2nd Video IF Amp		6AU6	7BK	
V6	3rd Video IF Amp		6AU6	7BK	
V7	4th Video IF Amp		6AU6	7BK	
V8	Video Det.		6AL5	6BT	
V9	Video Amp.		6AU6	7BK	
V10	Vide. Cutput		6V6GT	7AC	
V11	Sync. Sep.-DC Restorer-Sync. Phase Inverter		6SN7GT	8BD	
V12	Sound IF Amp.		6AU6	7BK	
V13	Ratio Det.		6AL5	6BT	
V14	AF Amp.		6AU6	7BK	
V15	Audio Output		6K6GT	7S	
V16	Vert.Osc.-Vert. Amp.		6SN7GT	8BD	
V17	Sync. Disc.		6AL5	6BT	
V18	Hor. Osc.		6SN7GT	8BD	
V19	Hor. Output		6BQ6G	8BT	
VL	Damper		5V4G	5L	
VR1	HV Rectifier		1B3GT	3C	
VR2	LV Rectifier		5U4G	5T	
VR3	Picture Tube		10BP4	10BP4	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450		PRSA450/40- 40	EDJ1C 119		TVL-64	Filter Red " "
B	40	450						Filter Blue
C2	80	450		AFH16K	EZ10074		TVL-9	" "
C3A	250	10		PRS12/250	ES10095		TVL-66	Hor. Cent. Cont. Bypass
B	1000	6		PR36/1000				Vert. Cent. Cont. Bypass
C4A	40	350		PRSA450/40- 40	EDJ101 06		TVL-54	Filter Red
B	30	250		PRS150/40				Filter Yellow
C	40	150						Filter Blue
C5A	10	450		PRSA222J30B	EZ10090			Hor. Osc. Decoupling " "
B	10	450						" "
C	10	450						Decoupling
D	150	50						Vert. Amp. Cath. Byp.
C6A	8	300		PRSA450/8-8	BRD1145		TVA-25	Decoupling
B	8	300						Filter
C7	10	25		PRS25/10	BR102A		TVA-5	Output Cath. Bypass
C8	5	50		PRS150/4	BRS50		TVA-13	Stabilizing Cap.
C9	680					GP2K-750		RF Coupling " "
C10	680					GP2K-750		" "
C11	680					GP2K-750		AGC Filter
C12	500					GP2K-500		RF Screen Bypass
C13	500					GP2K-500		RF Bypass
C14	50					GP1K-50		RF Coupling " "
C15	.68							" "
C16	25					GP1K-25		" "
C17	.47							" "
C18	1.5					NP0K-1.5		" "
C19	1.5					NP0K-1.5		Osc. Coupling
C20	5000							Mixer Screen Bypass
C21	680							Osc. Feedback " "
C22	3							" "
C23	500					GP2K-500		Osc. Fil. Bypass
C24	100			1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C25	5000			1467-005	1D5D5	GP2M-005	1FM-25	Mixer Plate Dec.
C26	1000			1468-001	1W5D1	GP2L-001	1FM-21	AGC Filter " "
C27	.25	200		P48-25	GT2P25		TC-2	" "
C28	1000			1468-001	1W5D1	GP2L-001	1FM-21	1st V. IF Decoupling
C29	100			1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C30	1000			1468-001	1W5D1	GP2L-001	1FM-21	AGC Filter
C31	1000			1468-001	1W5D1	GP2L-001	1FM-21	2nd V. IF Decoupling
C32	1000			1468-001	1W5D1	GP2L-001	1FM-21	2nd V. IF Fil. Bypass
C33	1000			1468-001	1W5D1	GP2L-001	1FM-21	RF Bypass
C34	100			1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C35	1000			1468-001	1W5D1	GP2L-001	1FM-21	AGC Filter
C36	1000			1468-001	1W5D1	GP2L-001	1FM-21	3rd V. IF Decoupling
C37	100			1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C38	1000			1468-001	1W5D1	GP2L-001	1FM-21	AGC Filter
C39	.25	200		P48-25	GT2P25		TC-2	" "
C40	5000			1467-005	1D5D5	GP2M-005	1FM-25	4th V. IF Decoupling
C41	100			1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C42	10			1468-00001	5W5Q1	GP1K-10	MS-41	V. Diode Filter
C43	.05	200		P238-05	GT2S5		TM-15	Video Coupling " "
C44	.05	600		P688-05	GT6S5		TM-15	" "
C45	.1	600		P688-1	GT6P1		TM-1	" "
C46	.25	600		684-25	GT6P25		TC-2	" "
C47	470	200		1468-0005	5W5T5	GP2K-500	1FM-35	2nd V. Amp. Cath. Byp.
C48	.05	600		P688-05	GT6S5		TM-15	Sync. Coupling
C49	1.5					NP0K-1.5		S. IF Coupling " "
C50	100			1468-0001	5W5T1	GP1K-100	1FM-31	" "
C51	.01	200		P488-01	GT2S1	GP2-335-01	TM-11	S. IF Decoupling
C52	330			1468-0003	5W5T3	GP2K-300	1FM-33	Diode Load Cap *
C53	330			1468-0003	5W5T3	GP2K-300	1FM-33	" " " *
C54	1000			1468-001	1W5D1	GP2L-001	1FM-21	De-emphasis
C55	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C56	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	AF Screen Bypass
C57	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C58	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	Output Plate Bypass
C59	.002	600		P688-002	GT6D2	GP2M-002	TM-22	Integrator Net.
C60	.005	600		P688-005	GT6D5	GP2M-005	TM-25	" "
C61	4700	500						Vert. Osc. Grid Cap.

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C62	.1	600		P688-1	GT6P1		TM-1	Vert. Discharge
C63	.25	600		684-25	GT6P25		TC-2	Vert. Sweep Coupling
C64	1500	500		1467-0015	1W5D15	GP2L-0015	DFM-215	Hor. Sync. Coupling " " "
C65	1500	500		1467-0015	1W5D15	GP2L-0015	DFM-215	" " "
C66	.02	600		P688-02	GT6S2		TM-12	Voltage Divider
C67	.005	600		P688-005	GT6D5	GP2M-005	TM-25	AFC Feedback
C68	.005	600		P688-005	GT6D5	GP2M-005	TM-25	AFC Filter " "
C69	.005	600		P688-005	GT6D5	GP2M-005	TM-25	" "
C70	330	500						Hor. Osc. Feedback
C71	6200	500						Fixed Trimmer
C72	390			1469-0004	5R5T4		MS-34	Hor. Discharge
C73	.1	200		P288-1	GT2P1		TM-1	Pic. Tube Cath. Dec.
C74	390	500		1469-0004	5R5T4		MS-34	Hor. Sweep Coupling
C75	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	Hor. Amp. Screen Bypass
C76	.035	600		P688-033				Damper Filter " "
C77	.1	600		P688-1	GT6P1		TM-1	" "
C78	500	10000				410-500		HV Filter
C79	.01	600		P688-01	GT6S1		TM-11	Line Filter
C80	.01	600		P688-01	GT6S1		TM-11	" "
C81	680					GP2K-750		RF Bypass

* When either item C52 or C53 are replaced, replace both with capacitors of equal values.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	25B795	Q13-137	AM-63-2	Volume Control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions.
C	Switch		Not Req.	76-1	SW-A	" " "
R2A	50KΩ	½	25B794	Q11-123	AM-44-S	Brightness Control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R2A per instructions.
R3	25000	2	25R793		43-2500	Contrast Control (Wire Wound)
R4A	1 Meg.	½		B11-137 ♦		Vert. Hold Control (Front) Dual Concentric
B	50KΩ	½	25B786	B11-123 ♦		Horiz. Hold Control (Rear)
C	Shaft End			E202		Attach per instructions in "Concentrikit".
R5	50000	½	25B769			Vertical Linearity Control
R6	2.5 Meg.	½	25B768			Height Control
R7	20Ω	2	25B707	W-20	43-20	Horiz. Centering Control - Wire Wound
R8	20Ω	2	25R706	W-20X10	43-20CT	Vertical Centering Control - Wire Wound
R9	25000	4	25B708		10-2500	Focus Control - Wire Wound

♦ Additional parts to be used with "Concentrikit".

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES: ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R10	22KΩ	½	RC20AE223M		RF Grid 20%
R11	10Ω	½	RC20AE101M		RF Cathode 20%
R12	10KΩ	1	RC30AE103M		RF Plate 20%
R13	33KΩ	½	RC20AE333M		RF Screen 20%
R14	1 Meg.	½	RC20AE105M		Mixer Grid 20%
R15	4700Ω	½	RC20AE472K		Mixer Plate Decoupling
R16	82KΩ	½	RC20AE823M		Mixer Screen 20%
R17	4700Ω	½	RC20AE472K		Mixer Grid Shunt
R18	22KΩ	½	RC20AE223K		Osc. Grid
R19	470Ω	½	RC20AE471K		Osc. Cathode
R20	68000	1	RC30AE683M		Osc. Plate 20%
R21	22KΩ	½	RC20AE223K		1st Video IF Grid
R22	220KΩ	½	RC20AE224K	BTS-2200	1st Video IF Decoupling
R23	1 Meg.	½	RC20AE105K	BTS-1 Meg.	AGC Network
R24	100KΩ	½	RC20AE104K	BTS-100K	" "
R25	100KΩ	½	RC20AE104K	BTS-100K	" "
R26	560KΩ	½	RC20AE562K	BTS-5600	2nd Video IF Grid
R27	68Ω	½	RC20AE680K		2nd Video IF Cathode
R28	2200Ω	½	RC20AE222K	BTS-2200	2nd Video IF Decoupling
R29	100KΩ	½	RC20AE104K	BTS-100K	AGC Network
R30	470Ω	½	RC20AE472K		3rd Video IF Grid
R31	68Ω	½	RC20AE680K		3rd Video IF Cathode
R32	2200Ω	½	RC20AE222K	BTS-2200	3rd Video IF Decoupling
R33	100KΩ	½	RC20AE104K	BTS-100K	AGC Network
R34	560Ω	½	RC20AE562K	BTS-5600	4th Video IF Grid
R35	680Ω	½	RC20AE682K		4th Video IF Plate
R36	2200Ω	½	RC20AE222K	BTS-2200	4th Video IF Decoupling
R37	68Ω	½	RC20AE680K		4th Video IF Cathode
R38	220KΩ	½	RC20AE224K	BTS-220K	AGC Network
R39	470KΩ	½	RC20AE474K	BTS-470K	" "
R40	560Ω	½	RC20AE562K	BTS-5600	Video Det. Diode Load
R41	1 Meg.	½	RC20AE105K	BTS-1 Meg.	1st Video Amp. Grid
R42	33KΩ	½	RC40AE332K	BT-2-3300	1st Video Amp. Plate
R43	1 Meg.	½	RC20AE105K	BTS-1 Meg.	2nd Video Amp. Grid
R44	680Ω	½	RC20AE681K	BTS-680	2nd Video Amp. Cathode
R45	4700Ω	2	RC40AE472K	BT-2-4700	2nd Video Amp. Plate
R46	47KΩ	½	RC20AE473K	BTS-47K	Picture Tube Grid
R47	27KΩ	½	RC20AE273K	BTS-27K	Voltage Divider
R48	1 Meg.	½	RC20AE105K	BTS-1 Meg.	Sync. Sep. Plate
R49	270KΩ	½	RC20AE274K	BTS-270K	Sync. Sep. Cathode
R50	33000Ω	½	RC20AE592K	BTS-3900	Sync. Phase Inv. Plate
R51	3900Ω	½	RC20AE392K	BTS-3900	" " " "
R52	1 Meg.	½	RC20AE105K	BTS-1 Meg.	Sync. Phase Inv. Grid
R53	3900Ω	½	RC20AE392K	BTS-3900	Sync. Phase Inv. Cathode
R54	150KΩ	½	RC20AE153K	BTS-15K	Integrator
R55	8200Ω	½	RC20AE822K	BTS-8200	"
R56	8200Ω	½	RC20AE822K	BTS-8200	"
R57	150KΩ	½	RC20AE154K		Sound IF Grid
R58	33KΩ	½	RC20AE333K	BTS-33K	Sound IF Decoupling
R59	12KΩ	½	RC20AE123K	BTS-12K	Voltage Divider
R60	90000Ω	1		BTA-10K-5%	Ratio Det. Diode Load 5%
R61	90000Ω	1		BTA-10K-5%	" " " 5%
R62	33KΩ	½	RC20AE333K	BTS-33K	De-emphasis
R63	330Ω	½	RC20AE331K	BW-½-330	AF Cathode
R64	470KΩ	½	RC20AE474K	BTS-470K	AF Plate
R65	2.2 Meg.	½	RC20AE225K	BTS-2.2 Meg.	AF Screen
R66	68KΩ	1	RC30AE683K	BTA-69K	Voltage Divider
R67	1000Ω	1	RC30AE102K	BW-1-1000	Filter
R68	470KΩ	½	RC20AE474K	BTS-470K	Output Grid
R69	68Ω	1	RC30AE681K	BTA-680	Output Cathode

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R70	180KΩ	½	RC20AE184K	BTS-180K	Voltage Divider
R71	15KΩ	½	RC20AE153K	BTS-15K	" "
R72	100KΩ	½	RC20AE104K	BTS-100K	Sync. Disc. Load
R73	100KΩ	½	RC20AE104K	BTS-100K	" " "
R74	4.7 Meg.	½	RC20AE475K	BTS-4.7 Meg.	Sync. Disc. Load
R75	5600Ω	½	RC20AE562K	BTS-5600	AFC Feedback Network
R76	1.2 Meg.	½	RC20AE125K	BTS-1.2 Meg.	Vert. Osc. Grid
R77	6.8 Meg.	½	RC20AE685K	BTS-6.8 Meg.	Voltage Divider
R78	1.2 Meg.	½	RC20AE125K	BTS-1.2 Meg.	" "
R79	100KΩ	½	RC20AE104K	BTS-100K	" "
R80	1.5 Meg.	½	RC20AE155K	BTS-1.5 Meg.	Vert. Osc. Plate
R81	2.2 Meg.	½	RC20AE225K	BTS-2.2 Meg.	Vert. Amp. Grid
R82	560Ω	½	RC20AE561K	BTS-560	Vert. Amp. Cathode
R83	5500Ω	½	RC20AE552K	BTS-5500	Vert. Peaking
R84	470KΩ	½	RC20AE474K	BTS-470K	Horiz. Osc. Grid
R85	68000Ω	½	RC20AE683K	BTS-6800	Horiz. Osc. Plate
R86	1000Ω	½	RC20AE102K	BTS-1000	Horiz. Osc. Cathode
R87	68KΩ	½	RC20AE683K	BTS-68K	Horiz. Osc. Grid
R88	270KΩ	½	RC20AE274K	BTS-270K	Horiz. Osc. Plate
R89	4700Ω	½	RC20AE472K	BTS-4700	Horiz. Peaking
R90	2200Ω	½	RC20AE222K	BTS-2200	Filter "
R91	1 Meg.	½	RC20AE105K	BTS-1 Meg.	Horiz. Amp. Grid
R92	47Ω	1	RC20AE470K		Parasitic Supp.
R93	75Ω	1	RC30AE750K	BW-1-68	Horiz. Amp. Cathode
R94	4700Ω	2	RC40AE472K	BT-2-4700	Horiz. Amp. Screen
R95	1800Ω	2	RC40AE182K	BW-2-1800	Filter
R96	8200Ω	½	RC20AE822K	BTS-8200	AFC Feedback Network
R97	3.3Ω	½	RC20AS033M		HV Filament 20%
R98	1 Meg.	2	RC40AE105K		HV Filter
R99	2200Ω	1	RC30AE222K	BW-1-2200	Filter
R100	470Ω	2	RC40AE471K	BT-2-470	Series Focus Control
R101	10000Ω	20	24BH102D	DG-1000	Filter (Wire Wound)
R102	1100Ω	20	24BH112D		Filter (Wire Wound)
R103	8200Ω	10	24B822E	AB-8000	Bleeder (Wire Wound)
R104	47KΩ	½	RC20AE473K	BTS-47K	Voltage Divider
R105	330Ω	½	RC20AE331K		Parasitic Supp.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.
T1	117VAC ② 1.80A	700VCT ③ 23A SEC. 4 6.3VAC ③ 7.5A	5VAC ④ 3A	5VAC ④ 2A	52C170	P-8153 † ‡	TP-410	

‡ Drill new mounting holes.
† Add series resistor to reduce plate voltage.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	NOTES
T2	40Ω		50B411				Hor. Osc. Coil
T3	200Ω	120Ω	56B115	A-8111	TS0-1	A-3000	Vert.Block Osc.Trans.
T4	410Ω Tap @ 170Ω	SEC. 1 10Ω Tap @ .5Ω SEC. 2 6Ω	55C113	A-8117	TFB-1		Hor. Output Trans.
T5	590Ω	7Ω	55C114	A-8115	TS0-1	A-3035	Vert.Output Trans.
T6A	14Ω		53B140	DY-1			Hor. Deflection Yoke
B	66Ω						Vert. Deflection Yoke
T7	260Ω		51A1065	FC-10			Focus Coil

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: CHICAGO PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
T8	8KΩ	3.2Ω	280Ω	.42	Part of 85C079	A-8114	RO-16	A-2900	

SPEAKER

ITEM No.	RATING: FIELD RES.	RATING: V. C. IMP.	REPLACEMENT DATA: ARTONE PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	65Ω	3.2Ω	85C079		⅋	⅋ Supplied on request; give field resistance & current.
	CONE DIA.	V. C. DIA.				
SP2	5 3/4"	9/16"				

ARTONE MODEL AR-23TV-1

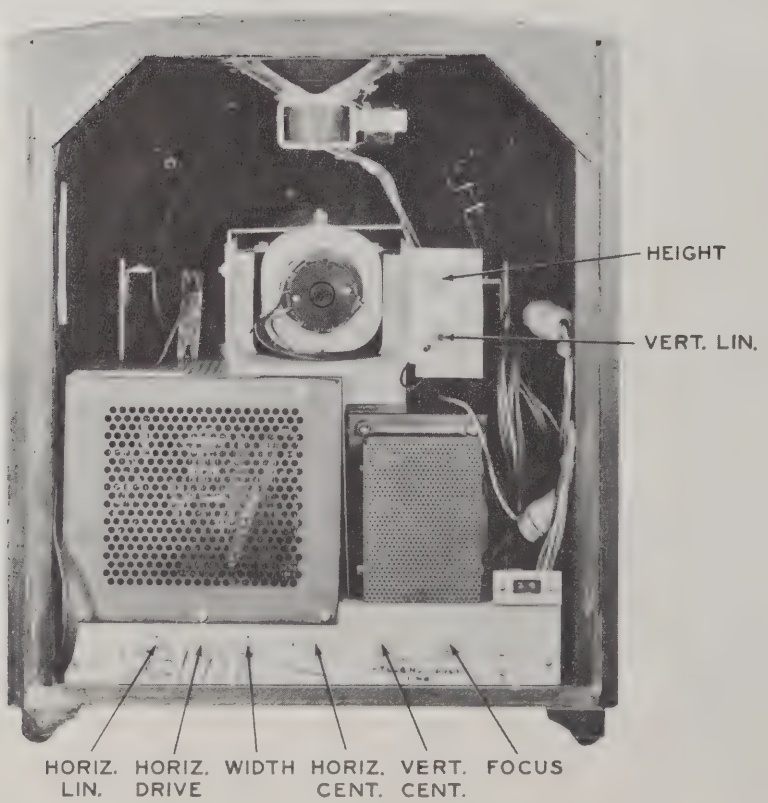
PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	ARTONE PART No.	MEISSNER PART No.	
L1	Ant. Coil	0Ω				Part of M1
L2	Ant. Coil	0Ω				Part of M1
L3	Ant. Input	0Ω				Part of M1
L4	Fil. Choke	.1Ω				Part of M1
L6	1st Video IF	.1Ω		50A372-1		
L7	2nd Video IF	.1Ω		50A372-1		
L8	3rd Video IF	.1Ω		50A372-1		
L9	4th Video IF	.1Ω		50A372-1		
L10	5th Video IF	.1Ω		50A372-1		
L11	Peaking	9.8Ω		51A1079		Wound on 39KΩ resistor.
L12	Peaking	12Ω		51A1080		Wound on 1 Meg resistor.
L13	Peaking	10Ω				Wound on 56KΩ resistor.
L14	Peaking	7Ω		51A1082		Wound on 1 Meg. resistor.
L15	Peaking	8.5Ω		51A1086		Wound on 1 Meg. resistor.
L16	Peaking	7Ω		51A1082		Wound on 1 Meg. resistor.
L17	4.5MC Sound Trap	4.5Ω		51A1037		
L18	Ratio Det. Trans.	4.5Ω	1Ω	50B406		
L19	Width Control	.2Ω		51B1072		
L20	Hor. Linearity	32Ω		51B1071		

MISCELLANEOUS

ITEM No.	PART NAME	ARTONE PART No.	NOTES
M1	Tuner	10727	Complete with Tubes
M2	Ion Trap	21B083	
M3	Fuse	39A334	Types 3AG .25A
	Knob	15B148-2	Volume, Brightness and Contrast
	Knob	15B147-2	Horizontal (Rear Section)
	Knob	15B150-2	Channel Selector (Front Section)
	Knob	15B151-1	Fine Tuning (Rear Sections)
	Safety Glass	22C220	

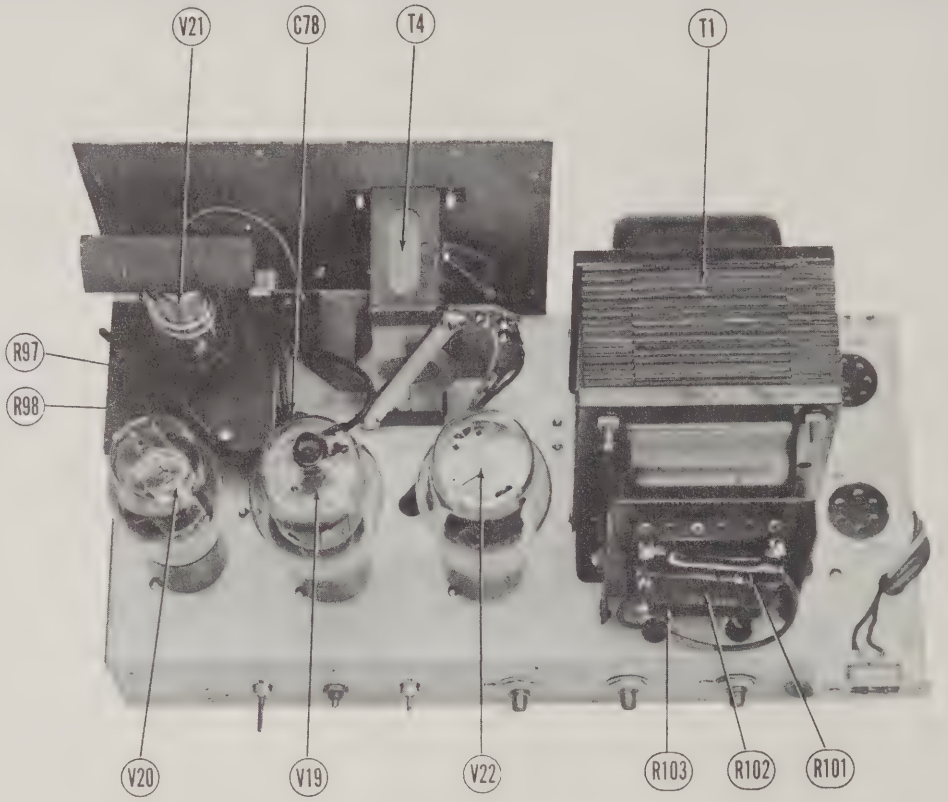


VERTICAL SWEEP CIRCUIT ADJUSTMENT

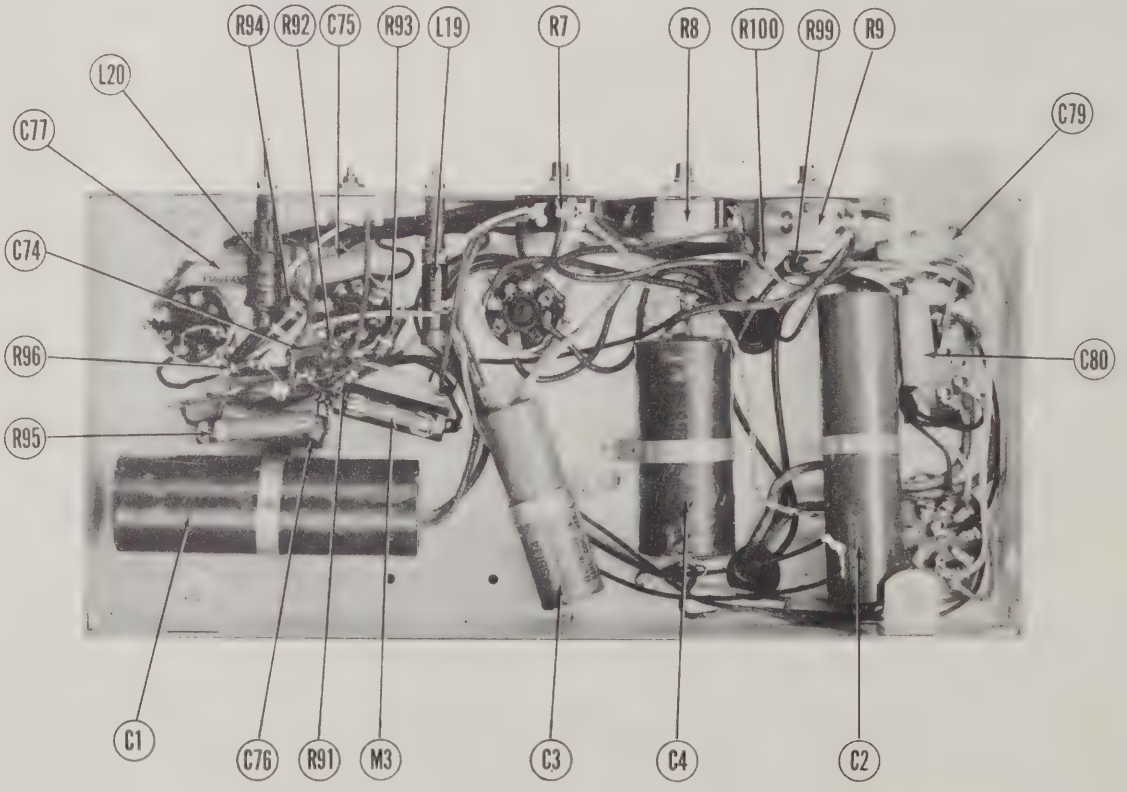
1. Turn the vertical centering and height controls so test pattern fills mask properly in the vertical plane.
2. Adjust the vertical linearity control for proper vertical symmetry of test pattern. Slight readjustment at vertical centering and height controls may be necessary.

HORIZONTAL SWEEP CIRCUIT ADJUSTMENT

1. Turn the horizontal drive adjustment (B1) clockwise as far as possible without crowding the right hand side of the test pattern. Insufficient horizontal drive will cause the raster to fall short of filling the mask horizontally.
   If it is not possible to "hold" the test pattern horizontally by adjustment of the horizontal hold control, set the horizontal hold control at the midpoint of its rotation and adjust the horizontal oscillator adjustment screw (B2) until picture "sync" horizontally.
2. Adjust the horizontal centering control and the width adjustment (B3) until test pattern fills the mask properly in the horizontal plane.
3. Set the horizontal linearity adjustment (B4) so the test pattern is symmetrical from left to right. Slight readjustment of the horizontal drive trimmer (B1) may be necessary when making this adjustment.



POWER SUPPLY CHASSIS-TOP VIEW



POWER SUPPLY CHASSIS-BOTTOM VIEW

PHOTOFACT* Folder

ARVIN MODELS 3100TB, 3100TM, 3101CM, 3120TM, 3121TM (CH. TE-272-1, -2)

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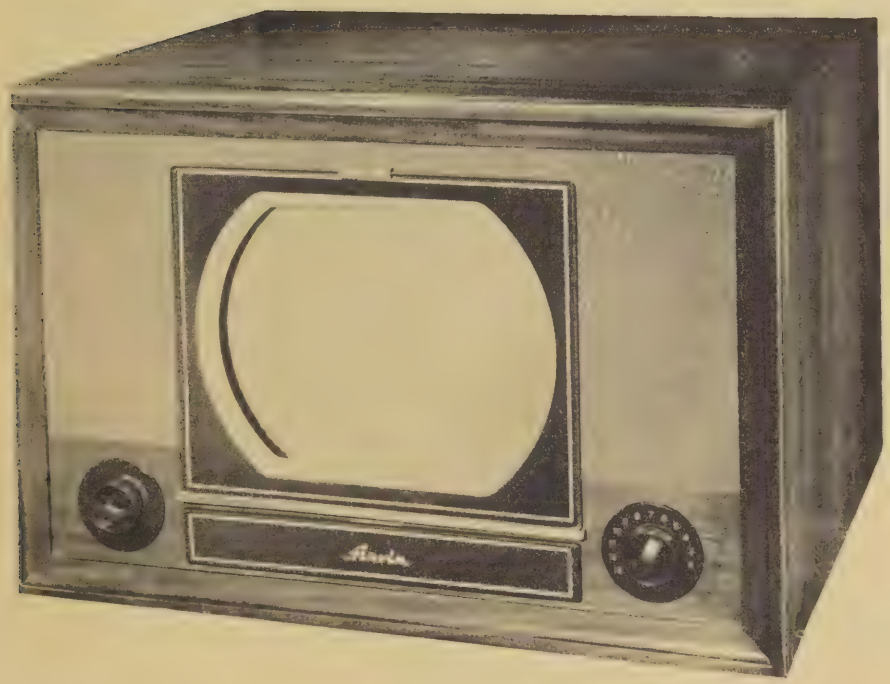

MODEL 3100TM

ARVIN MODELS 3100TB, 3100TM, 3101CM, 3120TM, 3121TM (CH. TE-272-1, -2)

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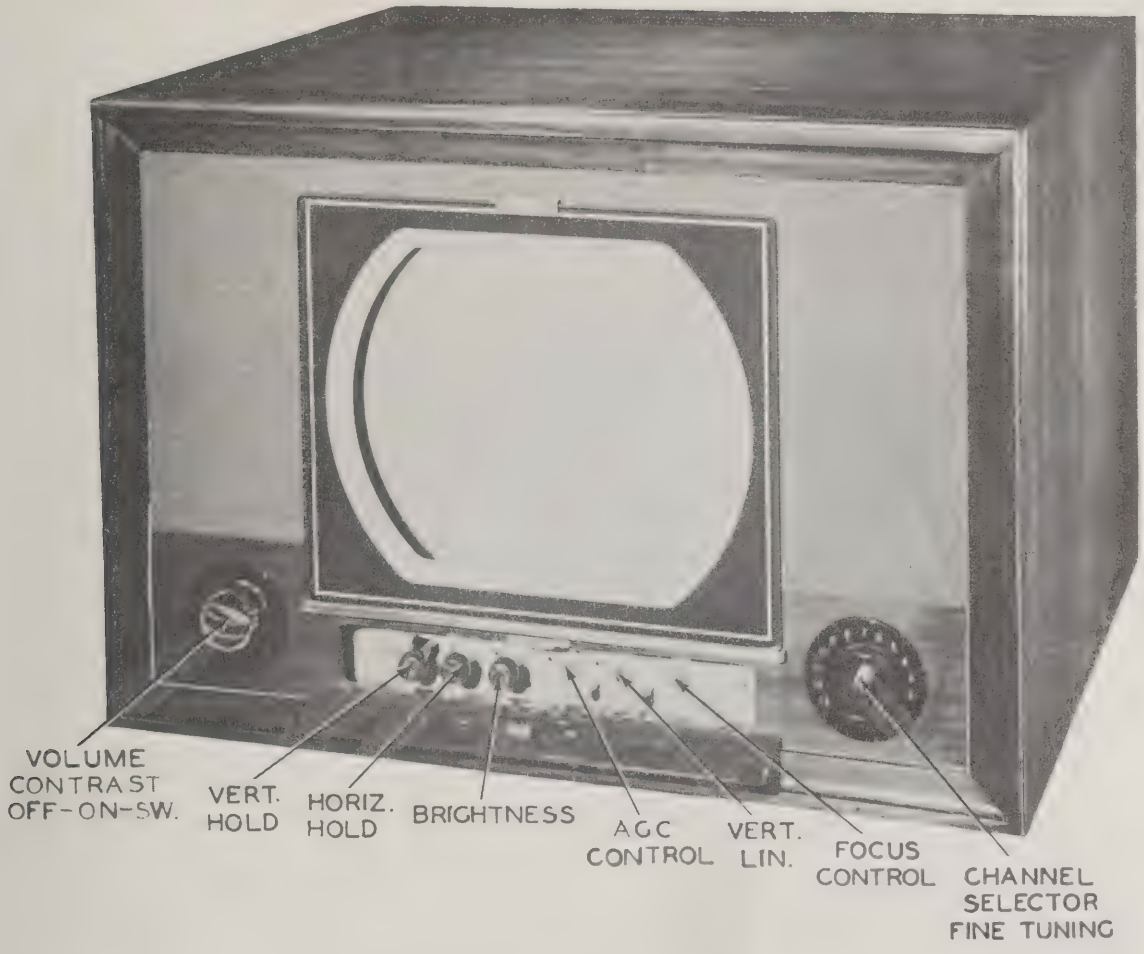
ARVIN MODELS 3100TB, 3100TM, 3101CM, 3120TM, 3121TM, (Ch. TE-272-1, -2



ARVIN MODELS 3100TB, 3100TM, 3101CM, 3120TM, 3121TM, (Ch. TE-272-1, -2)

ARVIN MODEL 3100TM

TRADE NAME	Arvin, Models 3100TB, 3100TM, 3101CM, 3120TM, 3121TM (Ch. TE-272-1 & TE-272-2)
MANUFACTURER	Noblitt Sparks Industries, Inc., Columbus, Indiana
TYPE SET	Television Receiver
TUBES	Twenty Four
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.94 Amp. @ 117 Volts AC
TUNING RANGE—Channels 2 thru 13	

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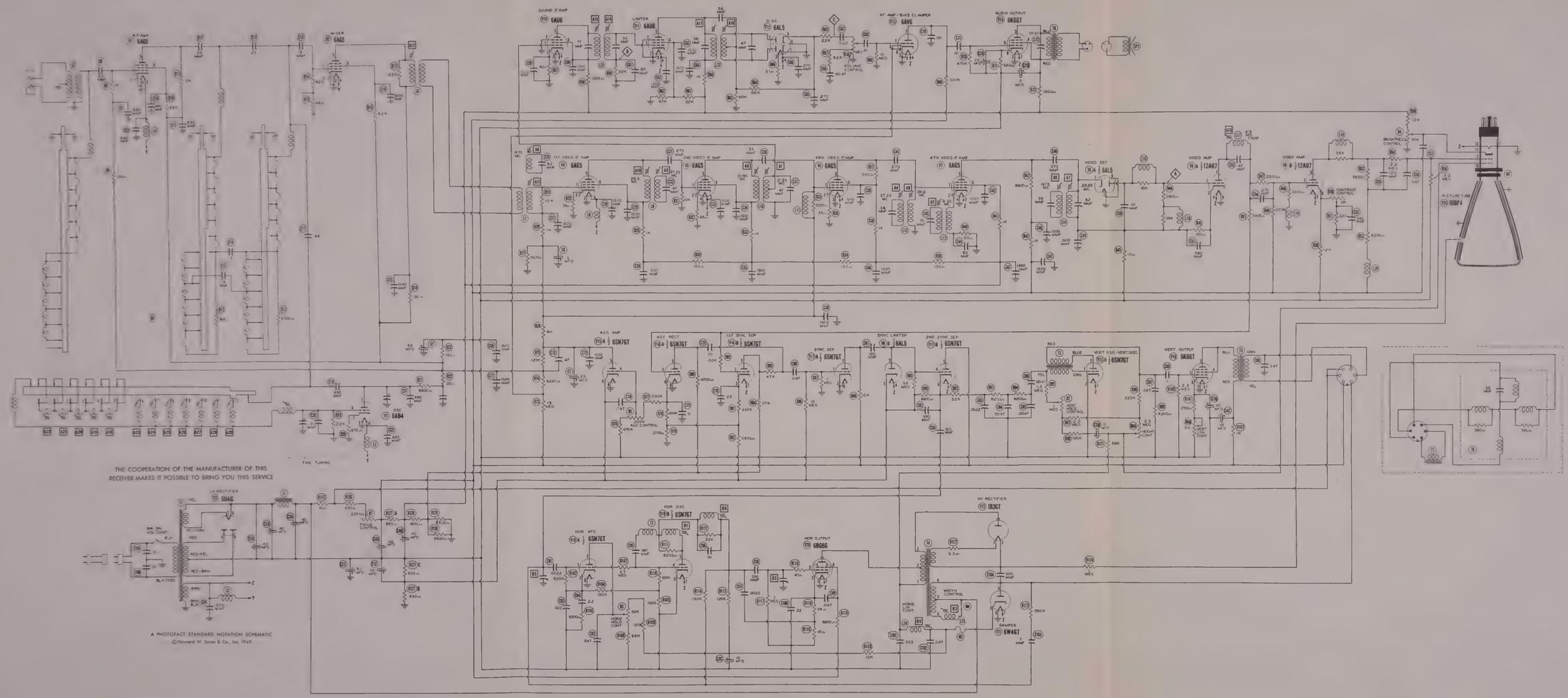
DATE 12/49 SET# 80 FOLDER #2


RF AMP 6AG5
MIXER 6AG5
OSC 6AB4
FINE TUNING
SOUND IF AMP 6AU6
LIMITER 6AU6
D-SC 6AL5
VOLUME CONTROL
AF AMP - BIAS CLAMPER 6AV6
AUDIO OUTPUT 6K6GT
1ST VIDEO IF AMP 6AG5
2ND VIDEO IF AMP 6AG5
3RD VIDEO IF AMP 6AG5
4TH VIDEO IF AMP 6AG5
VIDEO DET 6AL5
VIDEO AMP 12AV7
VIDEO AMP 12AU7
BRIGHTNESS CONTROL
CONTRAST CONTROL
PICTURE TUBE 10BP4
AGC AMP 6SN7GT
AGC KECK 6SN7GT
1ST SYNC SEP 6SN7GT
SYNC SEP 6SN7GT
SYNC LIMITER 6AL5
2ND SYNC SEP 6SN7GT
VERT OSC-VERT DISC 6SN7GT
VERT OUTPUT 6K6GT
VERT HOLD CONTROL
HEIGHT CONT
VERT LIN CONT
LV RECTIFIER 5U4G
SW ON VOL CONT
FOCUS CONTROL
AGC CONTROL
HOR AFC 6SN7GT
HOR OSC 6SN7GT
HOR OUTPUT 6BG6G
HV RECTIFIER 1B3GT
HORIZ HOLD CONT
HORIZ LIN CONT
WIDTH CONTROL
DAMPER 6W4GT
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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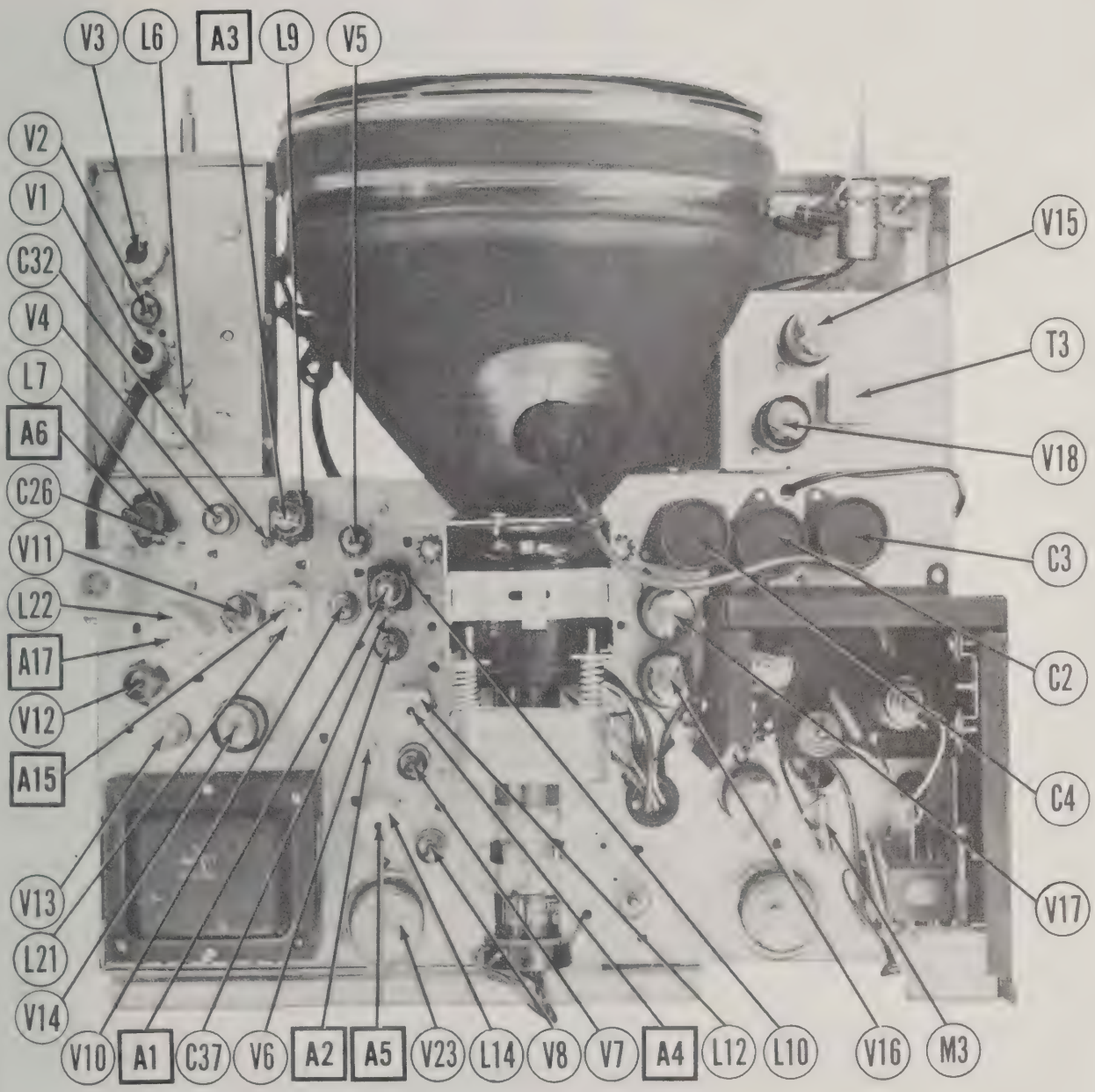


CHASSIS TOP VIEW

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

ARVIN MODELS 3100TB, 3100TM, 3101CM, 3120TM, 3121TM, (Ch. TE-272-1, -2)

TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

It is important that proper grounding of the receiver and sweep generator be accomplished before attempting alignment. If possible, place receiver and sweep generator on a metal plate, making sure the receiver chassis and sweep generator case are connected to the plate. If no metal plate is available, connect bonding strap between various points on the sweep generator case and the receiver chassis.

Proper grounding can be checked by touching the receiver chassis, the generator case, or the test leads. No change in meter reading or scope pattern should result.

If the set is to be aligned with the picture tube removed, tape the end of the high voltage lead and place it away from the receiver chassis.

VIDEO IF ALIGNMENT

Remove the local oscillator tube V3, to prevent erroneous indications.
Remove the AGC tube V15.
Connect a 250KΩ potentiometer between pins 5 and 6 of the AGC tube socket.
Adjust the potentiometer to read -4.5 volts on a VTVM connected between the junction of R27 and R28 and chassis.
During video alignment, both leads of the VTVM are connected to a point 120 volts negative with respect to the receiver chassis. DO NOT ground or touch the VTVM case during video alignment.
A sweep generator and oscilloscope must be used to align A11 and A12 (Step 8).
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.
For step 8 only, adjust the 250KΩ bias potentiometer to read -2 volts between the junction of R27 and R28, and chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube V2. Low side to chassis.	21.25MC (Unmod.)	Any	Across R44.	A1,A2	Adjust for MINIMUM deflection.
2.	Direct	"	27.25MC (Unmod.)	"	"	A3,A4	"
3.	Direct	"	19.75MC (Unmod.)	"	"	A5,A6	"
4.	Direct	"	22.65MC (Unmod.)	"	"	A7	Adjust for maximum deflection.
5.	Direct	"	24.8MC (Unmod.)	"	"	A8	"
6.	Direct	"	21.95MC (Unmod.)	"	"	A9	"
7.	Direct	"	26.3MC (Unmod.)	"	"	A10	"

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Direct	High side to ungrounded tube shield floating over mixer tube V2. Low side to chassis.	25MC (10MC Sweep)	22.2MC 24.5MC	Any	Vert. Amp. thru 33KΩ to Point (A). Low side to chassis.	A11,A12	Connect a 330Ω carbon resistor across the primary of each video IF transformer. (A7 thru A10). Adjust A11 and A12 for response curve similar to Fig 1 with markers as shown. Remove the 330Ω resistors.

OVERALL VIDEO IF RESPONSE CHECK

Leave sweep generator and oscilloscope connected as in step 8 of Video IF Alignment.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Direct	High side to ungrounded tube shield floating over mixer tube V2. Low side to chassis.	25MC (10MC Sweep)	21.25MC 22.1MC 25MC 25.75MC	Any	Vert. Amp. thru 33KΩ to Point (A). Low side to chassis.		Check for response curve similar to Fig 2 with markers as shown. If necessary retouch A7 thru A12 for optimum response. A serious dip in the response curve may be caused by a defective video detector tube V8A.

4.5MC TRAP ADJUSTMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.01MFD	High side to Point (A). Low side to chassis.	Not used	4.5MC (400~ Mod.)	Any	Vert. Amp. to pin 2 (Grid) of picture tube (V24). Low side to chassis.	A13	Adjust for MINIMUM 400~ response on scope.

SOUND IF ALIGNMENT

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	.01MFD	High side to pin 1 (Grid) of 6AU6 (V10). Low side to chassis.	21.25MC (1MC Sweep)	21.25MC	Any	Vert. Amp. to Point (B). Low side to chassis.	A14,A15	Adjust for maximum amplitude and symmetry as per Fig 3.
12.	.01MFD	"	"	"	"	Vert. Amp. to Point (C). Low side to chassis.	A16,A17	Adjust A16 so 21.25MC marker occurs at center of crossover lines as per Fig 4. Adjust A17 for maximum amplitude and straightness of cross over lines.

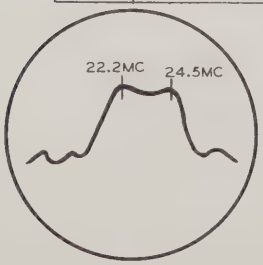


FIG. 1

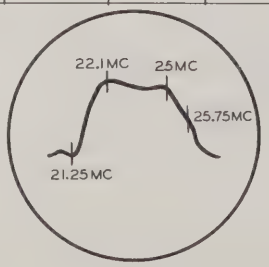


FIG. 2

FIG. 3

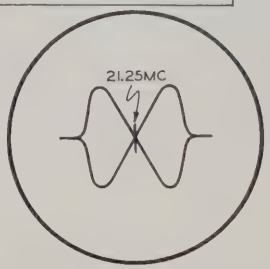


FIG. 4

ALIGNMENT INSTRUCTIONS (CONT.)

OSCILLATOR ALIGNMENT

The oscillator adjustment screws are reached from the front of the tuner through the numbered holes around the channel switch. Slight adjustment of any oscillator screw will not effect the other channels. If any oscillator screw is far out of adjustment, recheck all channels.

Do not turn any screw more than 7 turns from tight.

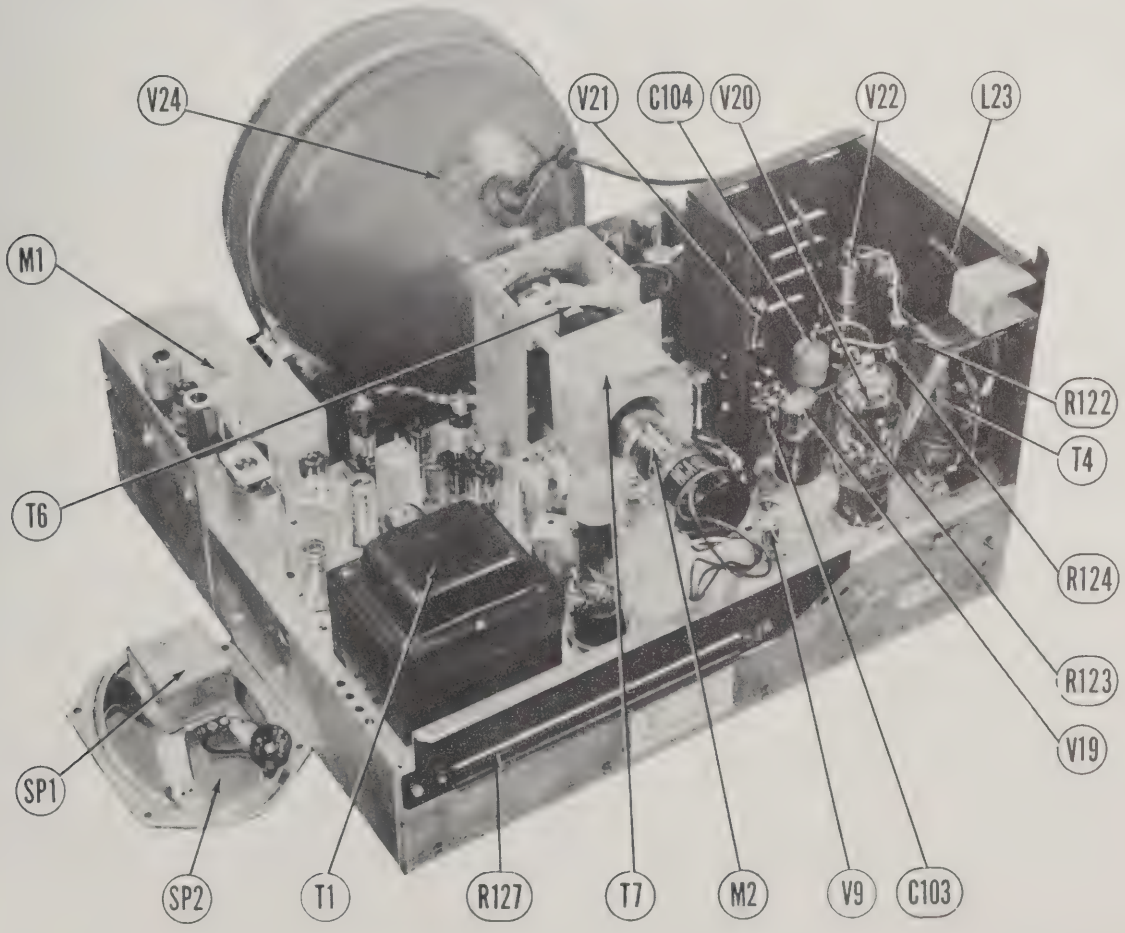
Set the fine tuning control to the center of its range.

The sound IF system must be properly aligned before attempting oscillator alignment.

If the adjustment screw does not have sufficient range on any high band channel, the oscillator coil can be compressed or expanded to adjust the inductance of the coil. Use extreme care when making adjustments in this manner.

The RF and mixer lines are pre-set at the factory and do not normally require adjustment in the field.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13.	Direct	Across antenna terminals.	87.75MC (Unmod.)	6	DC Probe to Point C. Common to chassis.	A18	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
14.	Direct	"	81.75MC	5	"	A19	"
15.	Direct	"	71.75MC	4	"	A20	"
16.	Direct	"	65.75MC	3	"	A21	"
17.	Direct	"	59.75MC	2	"	A22	"
18.	Direct	"	179.75MC	7	"	A23	"
19.	Direct	"	185.75MC	8	"	A24	"
20.	Direct	"	191.75MC	9	"	A25	"
21.	Direct	"	197.75MC	10	"	A26	"
22.	Direct	"	203.75MC	11	"	A27	"
23.	Direct	"	209.75MC	12	"	A28	"
24.	Direct	"	215.75MC	13	"	A29	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Recheck channels 13 thru 2, in that order. Touch up any channel that the oscillator is off frequency.



CHASSIS–TOP VIEW

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.2VDC	0V	6.3VAC	0V	160VDC	105VDC	0V		
V 2	6AG5	-.3VDC	0V	0V	6.3VAC	215VDC	95VDC	0V		
V 3	6AB4	175VDC	0V	0V	6.3VAC	175VDC	§-2VDC	2.4VDC		
V 4	6AG5	-.6VDC	.5VDC	0V	6.3VAC	112VDC	112VDC	.5VDC		
V 5	6AG5	0V	.8VDC	6.3VAC	0V	115VDC	115VDC	.8VDC		
V 6	6AG5	0V	.6VDC	0V	6.3VAC	55VDC	117VDC	.6VDC		
V 7	6AG5	0V	1.2VDC	6.3VAC	0V	135VDC	135VDC	1.2VDC		
V 8	6AL5	♦0V	◓ -20VDC	0V	6.3VAC	◓0V	0V	♦-15VDC		
V 9	12AU7	♦100VDC	♦ -1.2VDC	♦.6VDC	6.3VAC	6.3VAC	♦ 250VDC	♦ 117VDC	♦ 120VDC	0V
V 10	6AU6	0V	0V	0V	6.3VAC	120VDC	120VDC	.8VDC		
V 11	6AU6	-.4VDC	0V	0V	6.3VAC	130VDC	70VDC	0V		
V 12	6AL5	0V	-1VDC	1.2VAC	6.3VAC	-.1VDC	0V	-.4VDC		
V 13	6AV6	-.1VDC	0V	0V	6.3VAC	.1VDC	.1VDC	92VDC		
V 14	6K6GT	0V	0V	♦ 220VDC	♦ 230VDC	♦0V	0V	6.3VAC	♦15VDC	
V 15	6SN7GT	♦-100VDC ♦-107VDC	♦100VDC ♦380VDC	♦0V	♦40VDC	♦135VDC	♦70VDC	6.3VAC	0V	
V 16	6SN7GT	◓33VDC	◓150VDC	◓42VDC	♦100VDC	♦220VDC	♦112VDC	6.3VAC	0V	
V 17	6SN7GT	-1VDC	140VDC	0V	◓-20VDC	◓280VDC	◓1.3VDC	6.3VAC	0V	
V 18	6K6GT	0V	0V	♦340VDC	♦340VDC	♦0V	♦0V ♦35VDC	6.3VAC	♦45VDC ♦60VDC	
V 19	6SN7GT	♦-25VDC	♦120VDC ♦190VDC	♦-12VDC	♦-43VDC	♦185VDC	♦0V	6.3VAC	0V	
V 20	6BG6G	0V	0V	♦7.7VDC	0V	♦-1.4VDC	♦7.7VDC	6.3VAC	240VDC	TOP CAP *
V 21	6W4GT	0V	0V	340VDC	0V	250VDC	0V	6.3VAC	0V	
V 22	1B3GT	* DO NOT MEASURE								
V 23	5U4G	0V	260VDC	0V	400VAC	0V	400VAC	0V	260VDC	
V 24	10BP4	0V	-1.4VDC	PIN 10 310VDC	PIN 11 0V		PIN 12 6.3VAC			

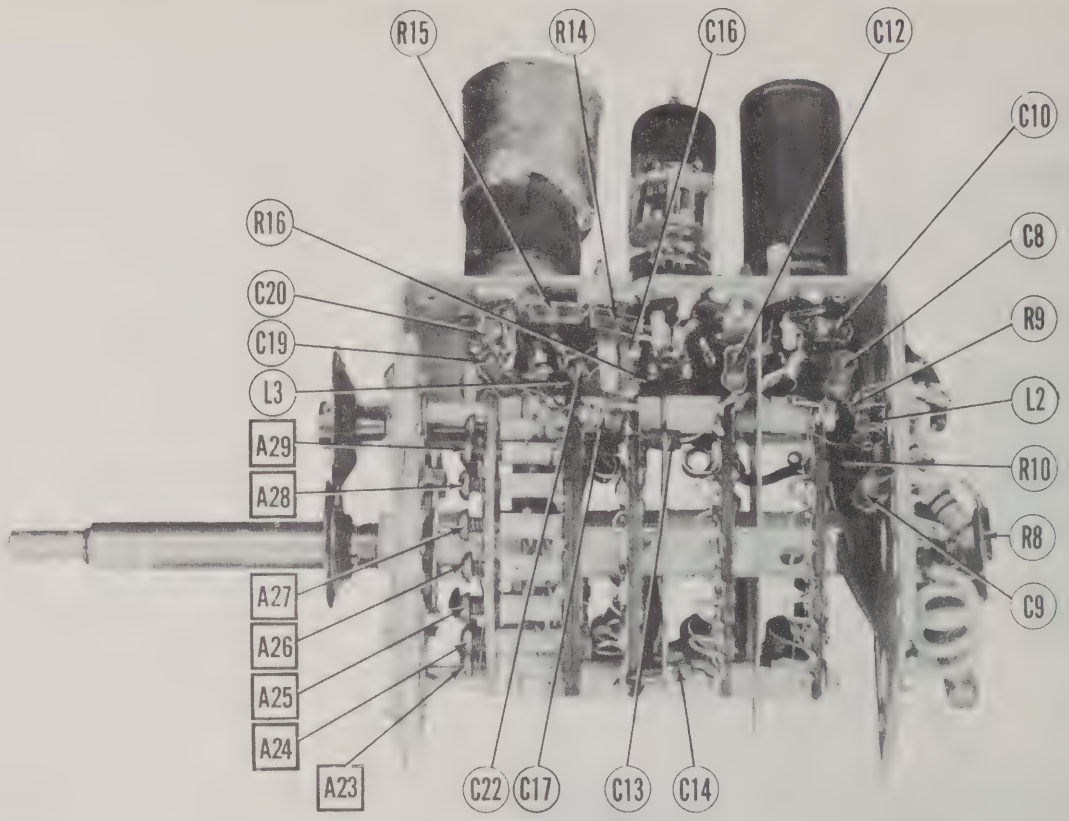
§ Taken with vacuum tube voltmeter.
♦ Measured from pin 6 of V19
◓ Measured from pin 6 of V15
* Do not measure
Note. AGC threshold control set at maximum for these measurements.

RESISTANCE READINGS

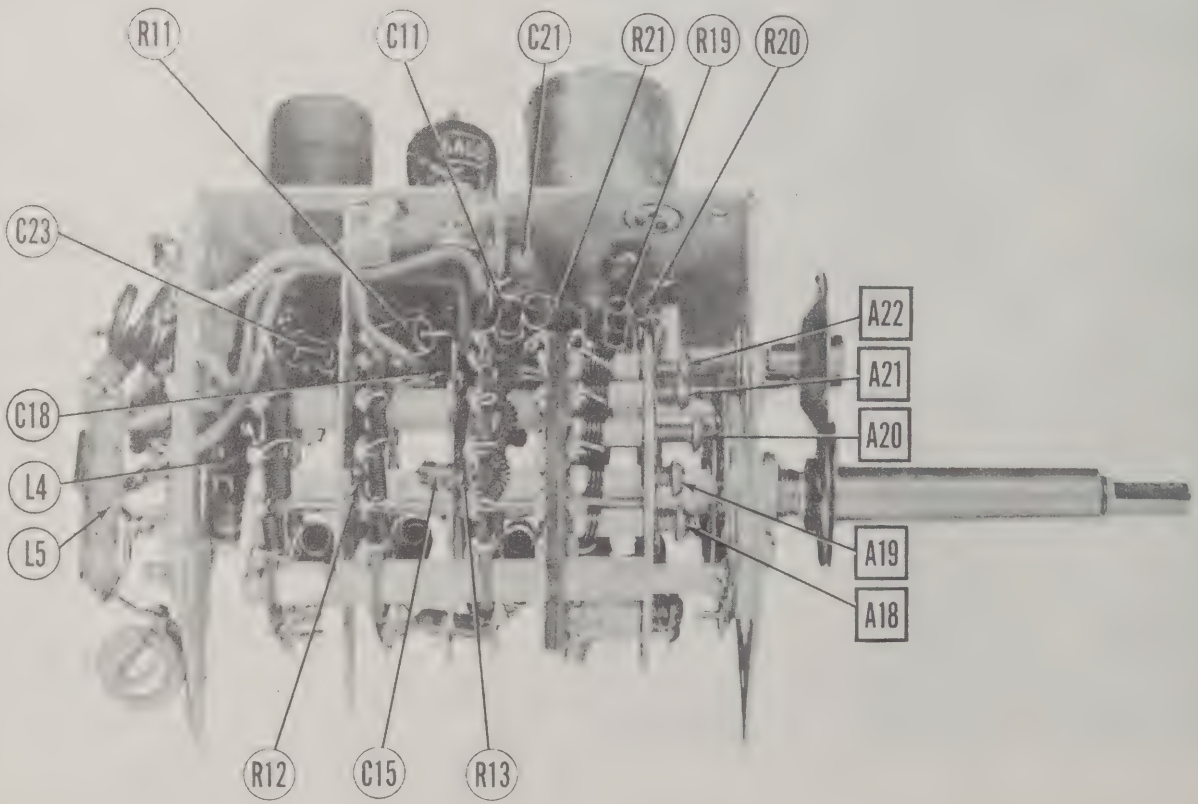
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	140KΩ	0Ω	.1Ω	0Ω	†10KΩ	†33KΩ	0Ω		
V 2	6AG5	1 Meg.	0Ω	0Ω	.1Ω	†500Ω	†82KΩ	0Ω		
V 3	6AB4	†8KΩ	Inf.	0Ω	.1Ω	†8KΩ	22KΩ	470Ω		
V 4	6AG5	6.5KΩ	39Ω	0Ω	.1Ω	†2.5KΩ	†2.5KΩ	39Ω		
V 5	6AG5	10KΩ	68Ω	.1Ω	0Ω	†2.3KΩ	†2.3KΩ	68Ω		
V 6	6AG5	5.5KΩ	39Ω	0Ω	.1Ω	†8KΩ	†2.2KΩ	39Ω		
V 7	6AG5	.1Ω	150Ω	.1Ω	0Ω	†8KΩ	†2KΩ	150Ω		
V 8	6AL5	♦10Ω	4 Meg.	0Ω	.1Ω	◓ 0Ω	0Ω	♦5.5KΩ		
V 9	12AU7	5.5KΩ	♦5.5KΩ	♦100Ω	.1Ω	.1Ω	†14KΩ	3.3KΩ	♦12KΩ	0Ω
V 10	6AU6	.1Ω	0Ω	0Ω	.1Ω	†2.2KΩ	†2.2KΩ	82Ω		
V 11	6AU6	22KΩ	0Ω	0Ω	.1Ω	†2KΩ	†17KΩ	0Ω		
V 12	6AL5	0Ω	100KΩ	2Ω	.1Ω	200KΩ	0Ω	100KΩ		
V 13	6AV6	10 Meg.	0Ω	0Ω	.1Ω	150KΩ	150KΩ	†330KΩ		
V 14	6K6GT	Inf.	0Ω	†3KΩ	†2.8KΩ	♦470KΩ	Inf.	.1Ω	♦680Ω	
V 15	6SN7GT	♦ 3Meg. ♦1.8Meg.	#1.6Meg. #300KΩ	♦0Ω	♦310KΩ	24KΩ	◓0Ω	.1Ω	0Ω	
V 16	6SN7GT	160KΩ	†30KΩ	330KΩ	11KΩ	†8KΩ	100KΩ	.1Ω	0Ω	
V 17	6SN7GT	1 Meg.	†15KΩ	0Ω	4 Meg.	†225Ω	◓6.8KΩ	.1Ω	0Ω	
V 18	6K6GT	Inf.	0Ω	†1.7KΩ	†1.7KΩ	2.2Meg.	♦5KΩ ♦7Ω	.1Ω	♦7.7KΩ ♦2.7KΩ	
V 19	6SN7GT	900KΩ	#150KΩ #120KΩ	280KΩ	250KΩ	#130KΩ	♦0Ω	.1Ω	0Ω	
V 20	6BG6G	Inf.	0Ω	♦85Ω	Inf.	1 Meg.	♦85Ω	.1Ω	†9KΩ	TOP CAP #200Ω
V 21	6W4GT	Inf.	Inf.	170KΩ	Inf.	†50Ω	Inf.	.1Ω	0Ω	
V 22	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP #350Ω
V 23	5U4G	Inf.	5.5KΩ	Inf.	1.3KΩ	Inf.	1.3KΩ	Inf.	5.5KΩ	
V 24	10BP4	0Ω	†1.3Meg.	PIN 10 #56KΩ	PIN 11 †17KΩ	†1.5KΩ	PIN 12 .1Ω			

† Measured from pin 8 of V23.
# Measured from pin 3 of V21.
♦ Measured from pin 6 of V19.
◓ Measured from pin 6 of V15.
Note. AGC threshold control set at maximum for these measurements.

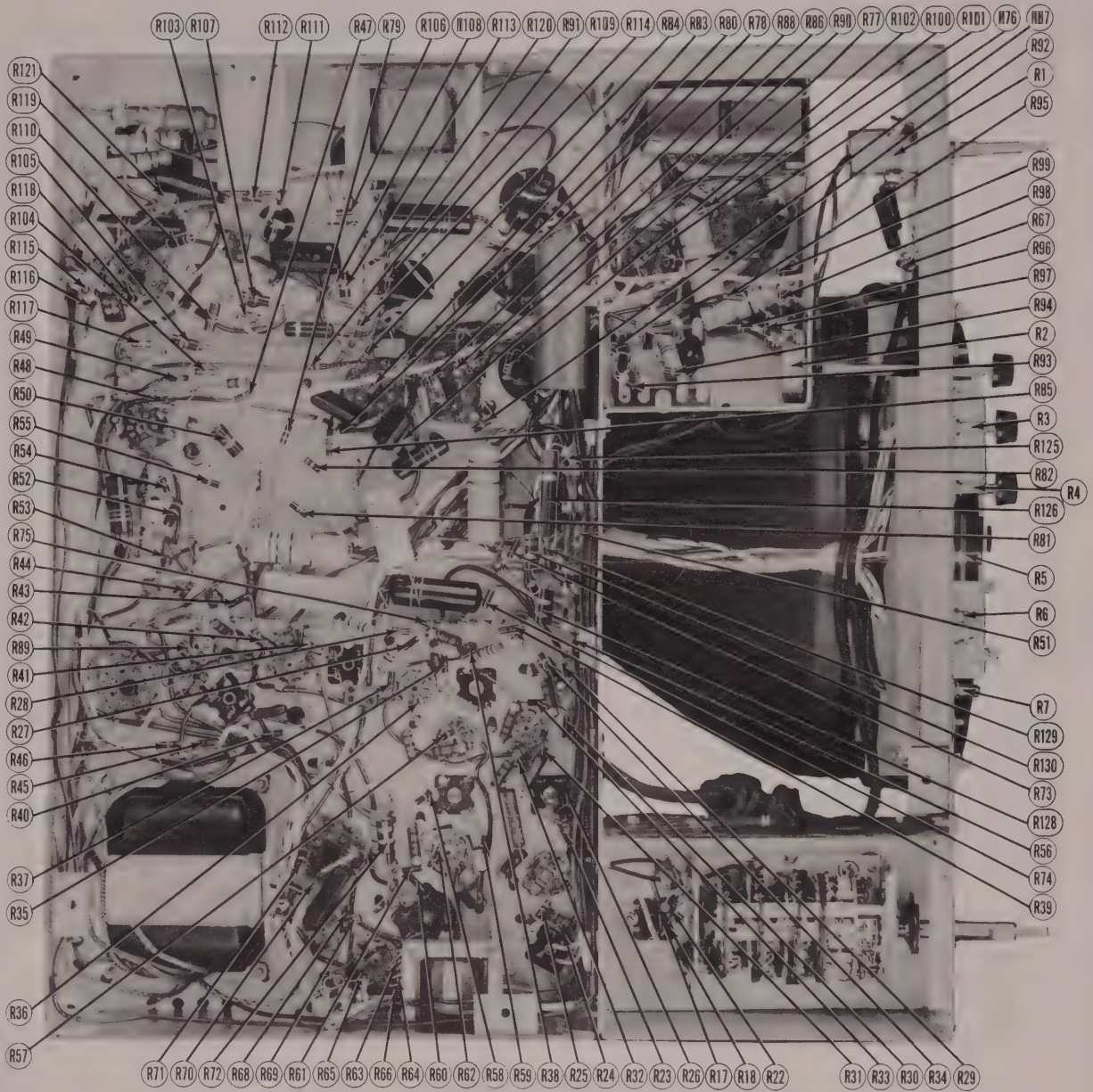
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ARVIN MODELS 3100TB, 3100TM, 3101CM,
3120TM, 3121TM, (Ch. TE-272-1, -2)

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		ARVIN PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Mixer	6AG5	6AG5	7BD	
V3A	Osc.	6AB4	6AB4		
B	Osc.	6C4	6C4	6BG	
V4	1st Video IF	6AG5	6AG5	7BD	
V5	2nd Video IF	6AG5	6AG5	7BD	
V6	3rd Video IF	6AG5	6AG5	7BD	
V7	4th Video IF	6AG5	6AG5	7BD	
V8	Video Det.-Sync. Limiter	6AL5	6AL5	6BT	
V9	Video Amp.	12AU7	12AU7	9A	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11	Limiter	6AU6	6AU6	7BK	
V12	Disc.	6AL5	6AL5	6BT	
V13	AF Amp.-Bias Clamper	6AV6	6AV6	7BT	
V14	Audio Output	6K6GT	6K6GT	7S	
V15	AGC Amp.-Vert. Osc.-Vert. Disch.	6SN7GT	6SN7GT	8BD	
V16	AGC Rect.-1st Sync. Sep.	6SN7GT	6SN7GT	8BD	
V17	Sync. Amp.-2nd Sync. Sep.	6SN7GT	6SN7GT	8BD	
V18	Vert. Output	6K6GT	6K6GT	7S	
V19	Hor. AFC-Hor. Osc.	6SN7GT	6SN7GT	8BD	
V20	Hor. Output	6BG6G	6BG6G	5BT	
V21	Damper	6W4GT	6W4GT	4CG	
V22	HV Rectifier	1B3GT	1B3GT	3C	
V23	LV Rectifier	5U4G	5U4G	5T	
V24A	Picture Tube	10BP4	10BP4	12D	
B	Picture Tube	12KP4	12KP4	12D	
C	Picture Tube	12LP4	12LP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	ARVIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	40	450	C22422-4	AFH8J1810D	UP9CJ913		TVL-27	◓ Filter
B	90	150						■ Vert. Output Cath. Bypass
C	50	150						▲ Filter
C2A	40	450	C22422-3	AFH82J16E	UP9CJ915		TVL-25	◓ Filter
B	10	450						■ Output Decoupling
C	80	200						▲ Filter
C3A	60	450	C22422-1	AFH1222J4D	UP9CJ914		TVL-68	◓ Filter
B	10	450						■ Decoupling
C	10	450						▲ Decoupling
D	20	150						Output Cath. Bypass
C4A	40	450	C22422-2	AFH882J	UP9CJ897		TVL-30	◓ Filter
B	40	450						■ Filter
C	10	450						▲ Vert. Output Decoupling
C5	30	450		PRS450/30	BR3045A		TVA-23	Decoupling *
C6	50	50	A22416	PRS50/10	BR550		TVA-13	AGC Filter
C7	25	50	A22417	PRS50/25	BR255A		TVA-15	AGC Filter
C8	25					GP1K-25		RF Coupling
C9	680					GP2K-680		AGC Filter
C10	680					GP2K-680		RF Screen Bypass
C11	680					GP2K-680		RF Bypass
C12	25					GP1K-25		RF Coupling
C13	.25							RF Coupling
C14	.5							RF Coupling
C15	1.5					NPOK-1.5		RF Coupling
C16	15					GP1K-15		RF Coupling
C17	.68							Osc. Coupling
C18	5000					811-005	29C1	Mixer Screen Bypass
C19	680					GP2K-680		Osc. Feedback
C20	3							Fixed Trimmer
C21	680					GP2K-680		RF Bypass
C22	680					GP2K-680		Osc. Filament Bypass
C23	680					GP2K-680		RF Filament Bypass
C24	1500					GP2L-0015		Filament Bypass
C25	1500					GP2L-0015		Mixer Plate Decoupling
C26	82							Fixed Trimmer
C27	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C28	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Fil. Bypass
C29	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Decoupling
C30	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C31	270	500	A22411	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C32	47			1469-00005	5R5Q5	NPOM-50	MS-45	Fixed Trimmer
C33	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Filament Bypass
C34	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Decoupling
C35	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C36	33	1000	A22410	1468-00004	5W5Q4	GP1K-33	1FM-44	IF Coupling
C37	47			1469-00005	5R5Q5	NPOM-50	MS-45	Fixed Trimmer
C38	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C39	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C40	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C41	270	500	A22411	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C42	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Screen Bypass
C43	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C44	82		C22702	1468-0001	5W5T1	GP1K-100	1FM-31	4th V. IF Cath. Bypass
C45	75			1469-000075		NPOM-75		Fixed Trimmer
C46	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Plate Decoupling
C47	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C48	270	500	A22411	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C49	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C50	10	500	C20290-100	1468-00001	5W5Q1	GP1K-10	MS-41	V. Diode Filter

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ARVIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C51	560	500	C202S0-561	1468-0006	1W5D	GP2K-560	1FM-35	V. Amp. Cathode Bypass
C52	560	500	C202S0-561	1468-0006	1W5D	GP2K-560	1FM-35	V. Amp. Cathode Dec.
C53	47			1469-00005	5R5D5	NP0M-50	MS-45	Fixed Trimmer
C54	270		C20301-271	1468-00025	5W5T25	GP2K-270	1FM-325	Video Coupling
C55	120		C20301-121	1468-00015	5W5T15	GP2K-120	1FM-315	V. Freq. Compensation
C56	1500		C202P4-152	P688-047	3T4S5		TM-15	V. Freq. Compensation
C57	.1	600	C20S35-104	P688-1	3T6P1		TM-1	Pic. Tube Cath. Decoupling
C58	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C59	1500		C20A5A-152	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Cath. Bypass
C60	1500		C20A5B-152	1467-0015	1W5D15	GP2L-0015	1FM-215	1st Sm. IF Decoupling
C61	100		C20330-101	1468-0001	5W5T1	GP1K-100	1FM-31	Limiter Grid Filter
C62	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	Limiter Filament Bypass
C63	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	Limiter Screen Bypass
C64	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	Limiter Plate Dec.
C65	270		C20301-271	1468-00025	5W5T25	GP2K-270	1FM-325	RF Bypass
C66	270		C20301-271	1468-00025	5W5T25	GP5K-270	1FM-325	Disc. Fil. Bypass
C67	.0022	600	C20296-222	P688-0022	3T6D2	GP2M-0022	TM-22	Audio Coupling
C68	.0047	600	P688-0047	C20285-472	3T6D5	GP2M-0047	TM-25	Tone Compensation
C69	.01	400	C20282-103	P488-01	3T4S1	GP2-335-01	TM-11	Audio Coupling
C70	.001	600	C20295-102	P688-001	3T6D1	GP2L-001	TM-21	De-emphasis
C71	.01	400	C20282-103	P488-01	3T4S1	GP2-335-01	TM-11	Audio Coupling
C72	.0047	600	P688-0047	C20285-472	3T6D5	GP2M-0047	TM-25	Output Plate Bypass
C73	.01	400	C20292-103	P488-01	3T4S1	GP2-335-01	TM-11	AGC Rect. Cath. Bypass
C74	.047	200	C20291-473	P288-047	3T2S5		TM-15	AGC Amp. Grid Filter
C75	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Amp. Plate Bypass
C76	.47	200	C20291-474	P288-47	3T2P5		TC-5	AGC Filter
C77	1500		C20300-152	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C78	.22	200	C20291-224	P488-22	3T2P25		TC-2	1st Sync. Sep. Cath. Bypass
C79	.001	600	C20295-102	P688-001	3T6D1	GP2L-001	TM-21	Sync. Coupling
C80	.047	400	C20285-473	P488-047	3T4S5		TM-15	Sync. Coupling
C81	100	500	C202A4-101	1463-0001	5W5T1	GP1K-100	1FM-31	Sync. Coupling
C82	39	500	C20290-391	1463-0004	5W5T4	GP2K-390	1FM-34	2nd Sync. Sep. Cath. Bypass
C83	.0022	600	C20296-222	P688-0022	3T6D2	GP2M-0022	TM-22	Integrator Net.
C84	.047	600	C20285-473	P688-047	3T6D5	GP2M-0047	TM-25	Integrator Net.
C85	.047	600	C20285-472	P688-047	3T6D5	GP2M-0047	TM-25	Integrator Net.
C86	.0047	600	C20285-472	P688-0047	3T6D5	GP2M-0047	TM-25	Vert. Sync. Coupling
C87	.047	500	C20285-473	P688-047	3T6S5		TM-15	Vert. Discharge
C88	.1	400	C20291-104	P288-1	3T6P1		TM-15	Vert. Sweep Coupling
C89	.047	200	C20291-473	P288-047	3T2S5		TM-15	Isolation
C90	180	500	C20290-180	1468-0002	5W5T2	GP2K-180	1FM-32	Hor. Sync. Coupling
C91	.0022	600	C20296-222	P688-0022	3T6D2	GP2M-0022	TM-22	Hor. Sync. Coupling
C92	.047	600	C20285-473	P688-047	3T6S5		TM-25	Hor. AFC Plate Bypass
C93	.022	400	C20292-223	P488-022	3T4S2		TM-12	AFC Filter
C94	.22	400	C20292-224	P488-22	3T4P25		TC-2	AFC Filter
C95	180	1000	A22418					Hor. Osc. Grid Cap.
C96	.01	600	C20304-103	P688-01	3T6S1	GP2-335-01	TM-11	Fixed Trimmer
C97	.0022	600	C20296-222	P688-0022	3T6D2	GP2M-0022	TM-22	Hor. Discharge
C98	390	500	C20290-391	1468-0004	5W5T4	GP2K-390	1FM-34	Hor. Sweep Coupling
C99	.047	1000	C20285-473	GT16S5	GT16S5		TM-15	Hor. Output Screen Bypass
C100	.22	400	C20292-224	P488-22	3T4P25		TC-2	Hor. Output Cath. Bypass
C101	.033	1000	C20289-333	P1089-033	GT16S3		MB-13	Damper Filter
C102	.047	1000	C20289-473	P1088-047	GT16S5		TR-15	Damper Filter
C103	3	1500	A22413					Hor. Feedback
C104	500	20000	A22496			410-500		HV Filter
C105	.01	600	C20295-103	P688-01	GT6S1		TM-11	Line Filter
C106	.01	600	C20295-103	P688-01	GT6S1		TM-11	Line Filter

• Not used in all models.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ARVIN PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	D22464-1	B13-137X #		Volume control, tapped @ 200K Ω, rear (Dual
B	10KΩ			B17-116 #		Contrast control, front Concentric)
C	Shaft					
	End			E187 #		Attach per instructions in "Concentrikit".
D	Switch			76-1 #		Attach per instructions in "Concentrikit".
R2A	1 Meg.	½	D22464-2	Q11-137	AM-61-S	Vert. hold control
B	Shaft		Not Req.	•	KSS-5	Attach to R2A per instructions
R3A	50KΩ	½	D22464-3	Q11-123	AM-44-S	Horiz. hold control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R3A per instructions
R4A	50KΩ	½	D22464-3	Q11-123	AM-44-S	Brightness control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R4A per instructions
R5	2.5MΩ	½	D22464-5	Q11-130	M-52-S	AGC Control
R6A	2.5Meg.	½	D22464-6			Height control (Dual Concentric)
B	500Ω	½				Vert. linearity control
R7	2250Ω	4	D22464-7		43-2250	Focus control, Wire Wound

• Use C-3 coupler and part of original shaft, to obtain desired length.
Additional parts to be used with "Concentrikit".

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ARVIN PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R8	150Ω 20%	½			AGC Network
R9	100Ω 20%	½		BTS-1000	RF Grid
R10	33Ω 20%	1			RF Screen
R11	10Ω 20%	1			RF Plate
R12	18Ω	½			RF Plate Coil Shunt
R13	47Ω	½			Mixer Grid Coil Shunt
R14	82Ω 20%	½			Mixer Grid
R15	1 Meg. 20%	½			Mixer Grid
R16	82Ω 2%	½			Mixer Screen
R17	2.4Ω 5%	½			Mixer Plate Transformer Shunt
R18	15Ω 20%	½			Mixer Plate Decoupling
R19	22Ω 20%	½			Osc. Grid
R20	47Ω 20%	½		BTS-470	Osc. Cathode
R21	68Ω 2%	1			Osc. Plate
R22	15Ω 2%	½			Osc. Plate Decoupling
R23	150Ω 20%	½	C20061-151		Decoupling Network

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ARVIN PART No.	IRC PART No.	IDENTIFICATION CODES
R24	10KΩ 5%	½	C22382-103		1st Video IF Transformer Shunt
R25	39Ω	½	C22381-390		1st Video IF Cathode
R26	1000Ω 20%	½	C20061-102	BTS-1000	1st Video IF Decoupling
R27	5600Ω 5%	½	C22382-562	BTS-5600-5%	AGC Network
R28	18KΩ 5%	½	C22382-183	BTS-18K-5%	AGC Network
R29	1000Ω 20%	½	C20061-102	BTS-1000	AGC Network
R30	150Ω 20%	½	C20061-151		Decoupling Network
R31	10KΩ 5%	½	C22382-103		2nd Video IF Grid
R32	68Ω	½	C22381-680		2nd Video IF Cathode
R33	1000Ω 20%	½	C20061-102	BTS-1000	2nd Video IF Decoupling
R34	150Ω 20%	½	C20061-151		Decoupling Network
R35	8200Ω 5%	½	C22382-822		3rd Video IF Grid Coil Shunt
R36	39Ω	½	C22381-390		3rd Video IF Cathode
R37	5600Ω 5%	½	C22382-562		3rd Video IF Plate
R38	1000Ω 20%	½	C20061-102	BTS-1000	3rd Video IF Decoupling
R39	150Ω 20%	½	C20061-151		Decoupling Network
R40	150Ω	½	C22381-151		4th Video IF Cathode
R41	1000Ω 20%	1	C20061-102	BTS-1000	4th Video IF Screen
R42	68000Ω 5%	1	C22383-682		4th Video IF Plate
R43	1000Ω 20%	½	C20061-102	BTS-1000	4th Video IF Plate Decoupling
R44	5600Ω 5%	½	C22382-562		Video Det. Diode Load
R45	10Ω 20%	½	C20061-100	BW-½-10	Bias Network
R46	100Ω	½	C22381-101	BW-½-100	Video Amp. Cathode
R47	2200Ω	½	C22381-222	BTS-2200	Video Amp. Plate
R48	33000Ω 5%	½	C22382-332	BTS-3300-5%	Video Amp. Plate
R49	220KΩ	2	C22381-224	BTS-220K	Voltage Divider
R50	12KΩ	2	C20302-123	BT-2-12K	Video Amp. Cathode
R51	220Ω	½	C22381-221	BW-½-220	Voltage Divider
R52	5600Ω	1	C20070-562	BTA-5600	Video Amp. Plate
R53	8200Ω 5%	½	C22383-822	BTA-8200-5%	Video Amp. Plate
R54	2.2 Meg.	½	C22381-225	BTS-2.2 Meg.	Voltage Divider
R55	2.2 Meg.	½	C22381-225	BTS-2.2 Meg.	Picture Tube Grid
R56	12KΩ	½	C22381-123	BTS-12K	Voltage Divider
R57	82Ω	½	C22381-820		1st Sound IF Cathode
R58	1200Ω	½	C22381-122	BTS-1200	1st Sound IF Decoupling
R59	22KΩ	½	C22381-223		Limiter Grid
R60	1000Ω 20%	½	C20061-102	BTS-1000	Limiter Plate Decoupling
R61	22KΩ 20%	½	C20061-223		Limiter Screen
R62	47KΩ 20%	½	C20061-473	BTS-47K	Voltage Divider
R63	100KΩ 5%	½	C22382-104	BTS-100K-5%	Disc. Diode Load
R64	100KΩ 5%	½	C22382-104	BTS-100K-5%	Disc. Diode Load
R65	22KΩ 20%	½	C20061-223	BTS-22K	De-emphasis
R66	5.1Ω	½	C20308-51		Disc. Filament-Wire Wound
R67	82KΩ	½	C22381-823	BTS-82K	Tone Compensation
R68	10 Meg. 20%	½	C20061-106	BTS-10 Meg.	AF Grid
R69	330KΩ	½	C22381-334	BTS-330K	AF Plate
R70	470KΩ 20%	½	C20061-474	BTS-470K	Output Grid
R71	680Ω	1	C20070-681	BTA-680	Output Cathode
R72	18000Ω	2	C20302-182	BW-2-1800	Filter
R73	1.8Meg. 5%	½	C22382-185	BTS-1.8Meg.-5%	Voltage Divider
R74	82000Ω 5%	½	C22382-822	BTS-8200-5%	Voltage Divider
R75	120KΩ 5%	½	C22382-124	BTS-120K-5%	AGC Amp. Plate
R76	470KΩ	½	C22381-474	BTS-470K	AGC Amp. Grid
R77	560KΩ	½	C22381-564	BTS-560K	Voltage Divider
R78	100KΩ	½	C22381-104	BTS-100K	AGC Rect. Cathode
R79	270KΩ	½	C22381-274	BTS-270K	AGC Rect. Cathode
R80	470KΩ	½	C22381-474	BTS-470K	AGC Rect. Plate
R81	330KΩ	½	C22381-334	BTS-330K	1st Sync. Sep. Cathode
R82	560KΩ	½	C22381-564	BTS-560K	1st Sync. Sep. Cathode
R83	150KΩ 20%	½	C20061-154	BTS-150K	1st Sync. Sep. Grid
R84	27KΩ	½	C22381-273	BTS-27K	1st Sync. Sep. Plate
R85	47KΩ	½	C22381-473	BTS-47K	Isolation
R86	10 Meg.	½	C22381-106	BTS-10 Meg.	Voltage Divider
R87	1 Meg.	½	C22381-105	BTS-1 Meg.	Sync. Amp. Grid
R88	15KΩ	1	C20070-153	BTA-15K	Sync. Amp. Plate
R89	3.9 Meg.	½	C22381-395	BTS-3.9 Meg.	2nd Sync. Sep. Grid
R90	680KΩ	½	C22381-684	BTS-6800	2nd Sync. Sep. Cathode
R91	5600Ω	½	C22381-562	BTS-5600	Isolation
R92	22KΩ	½	C22381-223	BTS-22K	Integrator
R93	8200Ω	½	C22381-822	BTS-8200	Integrator
R94	82000Ω	½	C22381-822	BTS-8200	Integrator
R95	1.5Meg. 5%	½	C22382-155	BTS-1.5Meg.-5%	Vert. Osc. Grid
R96	220KΩ	½	C22381-224	BTS-220K	Vert. Osc. Plate
R97	2.2 Meg.	½	C22381-225	BTS-2.2 Meg.	Voltage Divider
R98	100KΩ	½	C22381-104	BTS-100K	Voltage Divider
R99	8200Ω 5%	½	C22382-822	BTS-8200-5%	Vert. Peaking
R100	2.2 Meg.	½	C22381-225	BTS-2.2 Meg.	Vert. Output Grid
R101	27000Ω	½	C22381-272	BTS-2700	Vert. Output Cathode
R102	1000Ω 20%	½	C20061-102	BTS-1000	Vert. Output Plate Decoupling
R103	820KΩ 5%	½	C22382-824	BTS-820K-5%	Horiz. AFC Grid
R104	150KΩ	½	C22381-154	BTS-150K	Horiz. AFC Cathode
R105	150KΩ 5%	½	C22383-154	BTA-150K-5%	Horiz. AFC Cathode
R106	820Ω	½	C22381-822	BTS-8200	Horiz. AFC Filter Network
R107	2.7 Meg. 5%	1	C22383-275	BTA-2.7Meg.-5%	Voltage Divider
R108	68KΩ	½	C22381-683	BTS-68K	Voltage Divider
R109	120KΩ	½	C20070-124	BTA-120K	Voltage Divider
R110	100KΩ 5%	1	C22383-104	BTA-100K-5%	Horiz. Osc. Grid
R111	8200Ω 5%	½	C22382-822	BTS-8200-5%	Horiz. Osc. Transformer Shunt
R112	22KΩ	½	C22381-223	BTS-22K	Horiz. Osc. Transformer Shunt
R113	120KΩ	1	C20070-124	BTA-120K	Voltage Divider
R114	150KΩ	½	C22381-154	BTS-150K	Horiz. AFC Filter Network
R115	47Ω	1	C20070-470	BW-1-47	Bias Network
R116	470 20%	½	C20061-470		Parasitic Supp.
R117	1 Meg.	½	C22381-105	BTS-1 Meg.	Horiz. Output Grid
R118	39Ω	1	C20070-390	BW-1-39	Horiz. Output Cathode
R119	6800Ω	1	C20070-682	BTA-6800	Horiz. Output Screen
R120	10KΩ	½	C22381-103	BTS-10K	Filter
R121	56KΩ	½	C22381-563	BTS-56K	Vert. Osc. Plate Decoupling
R122	3.3Ω	½	C20308-33		HV Rect. Filament-Wire Wound
R123	560KΩ	½	C22381-564	BTS-560K	Feedback
R124	1 Meg. 20%	1	C20103-105		HV Filter
R125	10Ω 20%	½	C20061-100	BW-½-10	Filter Network
R126	330Ω	2	C20309-331	BW-2-330	Focus Coil Shunt-Wire Wound

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ARVIN PART No.	IRC PART No.	IDENTIFICATION CODES
R127A	850Ω	12		DG-850	Filter-Wire Wound
B	650Ω	6	C22499		Bias Network-Wire Wound
C	650Ω	6			Bias Network-Wire Wound
R128	18000Ω	2	C20302-182	BT-2-1800	Voltage Divider
R129	68000Ω	2	C20302-682	BT-2-6800	Bleeder
R130	68000Ω	2	C20302-682	BT-2-6800	Bleeder

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC	760VCT @ 1.94A	5VAC .250A DC	6.3VAC @ 3A	E22571	P-6315 and P-5014 #	P-3059	TP-410

Mount filament transformer under chassis.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING SEC.	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	35Ω	SEC. 1 950Ω	C22563				Hor.Block Osc.Trans.
		SEC. 2 15100Ω					
		36Ω					
T3	165Ω	SEC. 1	C22446	A-6121 †	A-4000 †	T80-2	Vert.Block Osc.Trans.
T4	33Ω	SEC. 1	C22564	A-6117		TF8-1	Hor. Output Trans.
	Tap @ 1732Ω	10.8Ω					
		Tap @ .5Ω					
		SEC. 2 0Ω					
T5	521Ω	6.9Ω	C22567	A-8116	A-3035 †	TS0-4	Vert. Output Trans.
T6A	13.5Ω		C22575	DY-1			Hor.Deflection Coil
B	64.6Ω						Vert.Deflection Coil
T7	364Ω		C22646				Focus Coil

† Drill one new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T8	6600Ω	3.2Ω	326Ω	.3Ω	C22497	A-3849	A-2902	RO-13	

SPEAKER

ITEM No.	RATINGS FIELD RES.	RATINGS V. C. IMP.	REPLACEMENT DATA ARVIN PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	PM	3.2Ω	C22475		57A21	

ITEM No.	RATINGS CONE DIA.	RATINGS V. C. DIA.
SP2	4 3/4" x 7"	3/4"

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 cps)	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.240A	48Ω	1.5Henries	D22561	C-2325	C-2991	TR-4200	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ARVIN PART No.	MEISSNER PART No.	NOTES
L2	Ant. Input	0Ω				Part of tuner.
L3	Fil. Choke	0Ω				Part of tuner.
L4	Fil. Choke	0Ω				Part of tuner.
L5	Fil. Choke	0Ω				Part of tuner.
L6	Mixer Plate	.3Ω	.1Ω	C22398		Part of tuner.
L7	1st Video IF	.1Ω	.1Ω	C22498		
L8	Fil. Choke	.1Ω		A22456		
L9	2nd Video IF	.2Ω		C22502		
L10	3rd Video IF and Sound Take-Off	.2Ω		C22555		

ARVIN MODELS 3100TB, 3100TM, 3101CM, 3120TM, 3121TM, (Ch. TE-272-1, -2)

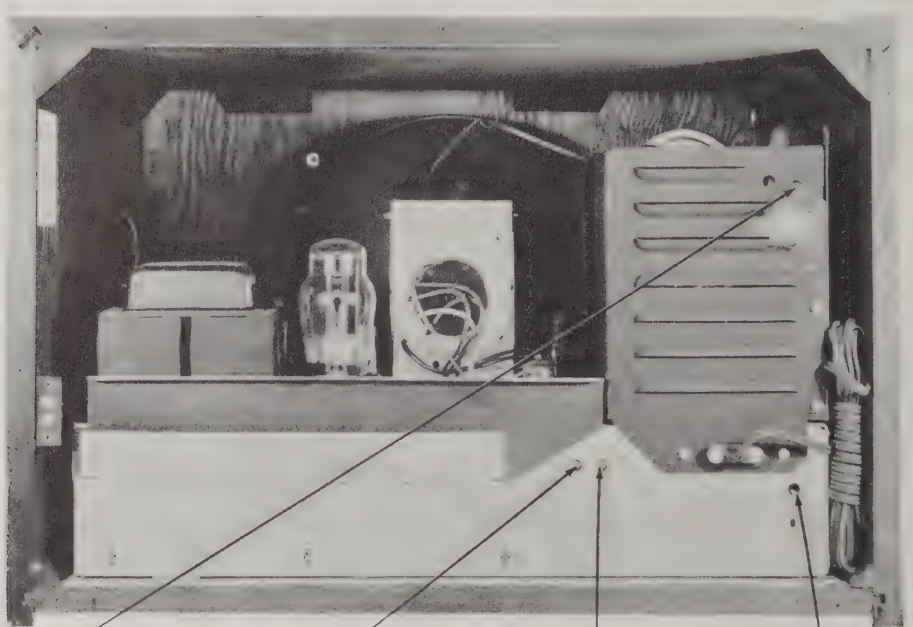
PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF) CONT.

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ARVIN PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L11	3rd Video IF Grid	2.5Ω		C22500-5		36 microhenries
L12	4th Video IF	.2Ω		C22556		
L13	Sound Trap	.2Ω		C22558		
L14	5th Video IF	.2Ω		C22557		
L15	Peaking	4.2Ω		C22500-3		93 microhenries. Wound on 10KΩ resistor. Orange identification dot.
L16	Peaking	6Ω		C22500-1		180 microhenries. Wound on 39KΩ resistor. White identification dot.
L17	4.5MC Sound Trap	1Ω		C22501		
L18	Peaking	7.5Ω		C22500-1		180 microhenries. Wound on 39KΩ resistor. White identification dot.
L19	Peaking	6Ω		C22500-3		250 microhenries. Green identification dot.
L20	Peaking	7.5Ω		C22500-3		250 microhenries. Green identification dot.
L21	Sound IF	.2Ω	.2Ω	C22565		
L22	Disc.Trans.	.1Ω	.1Ω	C22566		
L23	Width Cont.	.5Ω		C22559		
L24	Hor. Linearity	36Ω		C22562		

MISCELLANEOUS

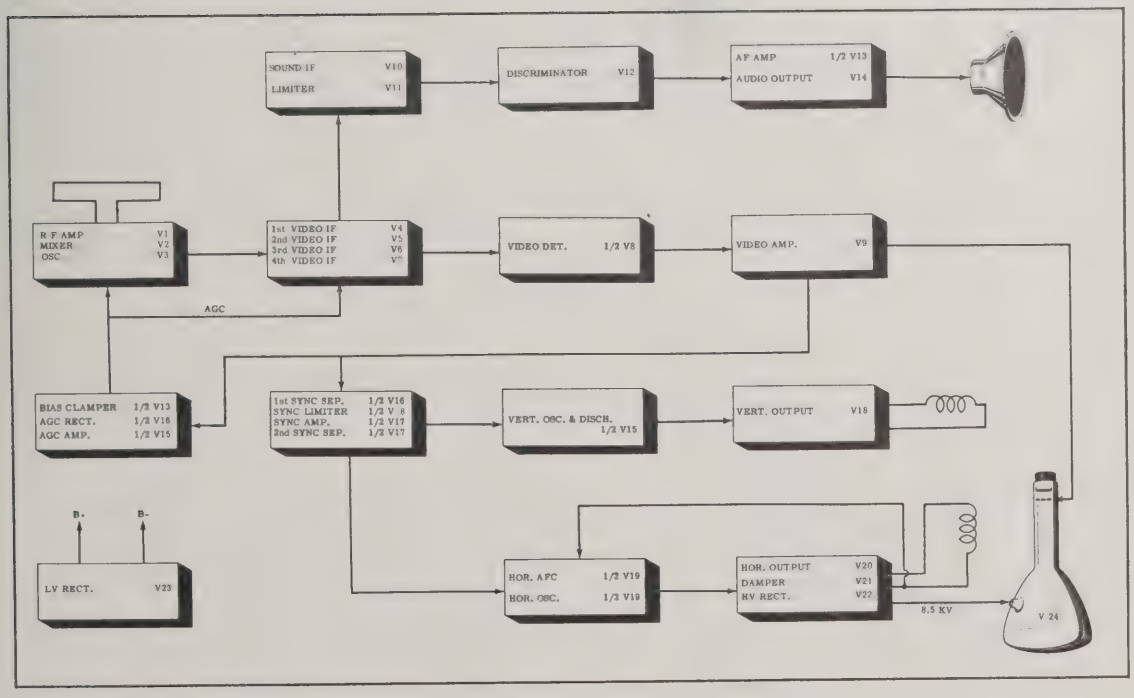
ITEM No.	PART NAME	ARVIN PART No.	NOTES
M1	RF Tuner	AE22550-1	
M2	Ion Trap	C22568	
M3	Fuse	A22493	Type GJV .25A
M4	Width Switch	A22549	Used on chassis TE 272-2 only.
	Cabinet	R22674	
	Cabinet Back	C22680	
	Control Door	D22681	
	Escutcheon	C22687-2	Channel indicator.
	Escutcheon	C22687-1	Volume and picture.
	Safety Glass	D22675	
	Trimmer	A22418	Includes Hor. locking range (10-160MMF) and Hor. drive (40-370MMF) trimmers.
	Knob	A22682	Channel selector
	Knob	A22683	Fine tuning
	Knob	A22684	Volume
	Knob	A22685	Contrast
	Knob	A22686-1	Vert. hold
	Knob	A22686-2	Hor. hold
	Knob	A22686-3	Brightness
	Mask	D22749	Picture Tube
	Knob Spring	A22708	Channel selector and contrast
	Knob Spring	A22707	Volume
	Knob Spring	A22706	Fine tuning
	Ant. Terminal Board	A22673	
	Power Cord and Plug	A22644	



CABINET – REAR VIEW

CRITICAL LEAD DRESSING

1. All by-pass condenser leads on the IF strip as short as possible.
2. Short lead between body of R65 and pin 8 of V12.
3. Do not reroute bus wire from pin 2 of V11.
4. Filament leads between V12, V13, V14 keep down to chassis and away from grid and plate leads.
5. All leads crossing IF circuits should be held close to chassis. Movement of such leads could change alignment.
6. Pix IF coupling capacitors must be away from the chassis. Moving these will affect alignment.
7. All peaking coils should be held away from chassis.
8. Green lead from pin 2 of V9, white-orange lead from pin 8 of V9 away from chassis.
9. Blue lead from pin 5 of V13 close to chassis.
10. C56, C55 away from chassis.
11. R105, R110, R107, R104, R106 should have long leads and held up and away from tube sockets and chassis.
12. Keep leads from L23 (width control) away from transformer frame.



BLOCK DIAGRAM

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

HORIZONTAL FREQUENCY ADJUSTMENT

Connect a jumper across terminals "C" and "D" of the horizontal oscillator transformer T2. Tune in a station and, if possible, sync the picture and proceed as follows:

1. Turn horizontal hold control fully clockwise. Adjust the Frequency Adjustment (B1) so picture is just out of sync and the horizontal blanking appears as a vertical bar.

2. Turn the hold control approximately a quarter of a turn from the fully clockwise position and notice the picture width and linearity. If the width and linearity is incorrect, adjust the horizontal drive (B2), width (B3) and horizontal linearity (B4) controls until the picture is correct. If B2, B3 and B4 required adjustment repeat step 1 above. In those models employing 12 inch picture tube the width adjustment coil (B3) is not connected.

HORIZONTAL LOCKING RANGE ADJUSTMENT

Turn the horizontal hold control fully counterclockwise. Remove signal momentarily by turning channel switch to another channel and back again. Slowly turn the hold control clockwise and note the number of diagonal bars that appear just before the picture "syncs".

If more than 9 bars are present just before synchronization, turn the horizontal locking range trimmer (B5) slightly clockwise. If less than 7 bars are present, turn B5 slightly counterclockwise.

Turn the hold control counterclockwise and momentarily interrupt the signal and check the number of bars present at the pull-in point. Repeat this procedure until 7 to 9 bars are present.

HORIZONTAL OSCILLATOR WAVEFORM ADJUSTMENT

Remove the jumper across terminals "C" and "D" of T2.

Turn the horizontal hold control fully clockwise. Adjust B6 with a non-metallic screwdriver until the horizontal blanking bar is present on the raster.

Connect the low capacity probe of an oscilloscope to terminal "C" of T2. Turn the horizontal hold control one quarter of a turn from the clockwise position until the picture "syncs". The pattern on the scope should be similar to Fig. 5. Adjust B6 until the broad and narrow peaks are of the same amplitude (If necessary, while making this adjustment turn the hold control to keep the picture in synchronization).

This adjustment must be carefully made to assure correct circuit operation. If the broad peak is lower in amplitude than the sharp peak, the oscillator drift becomes greater and the circuit has great susceptibility to noise pluses. However, if the broad peak is greater in amplitude than the sharp peak, the oscillator is overstabilized, the pull-in range inadequate, and there is the possibility of double triggering of the oscillator as the horizontal hold control approaches the extreme clockwise position.

HORIZONTAL OSCILLATOR ADJUSTMENTS CHECK

Turn the horizontal hold control fully counterclockwise, Momentarily remove the signal and then slowly turn the hold control clockwise and note the number of bars present just before the picture synchronizes.

If more than 3 bars are present, turn B5 slightly clockwise. If less than 3 bars are present, turn B5 slightly counterclockwise. Momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 3 bars are present just before synchronization occurs.

Turn the horizontal hold control fully clockwise. The picture should be just out of synchronization to the extent that the horizontal blanking bar appears as a single vertical or diagonal bar in the picture. Retouch B6 until this condition exists.

FIG. 5

AGC TRESHOLD ADJUSTMENT

Turn the set on and tune in a local TV station. Turn the contrast control to the mid-position of its range. Adjust the AGC threshold control and brightness control for a picture with proper contrast and brightness.

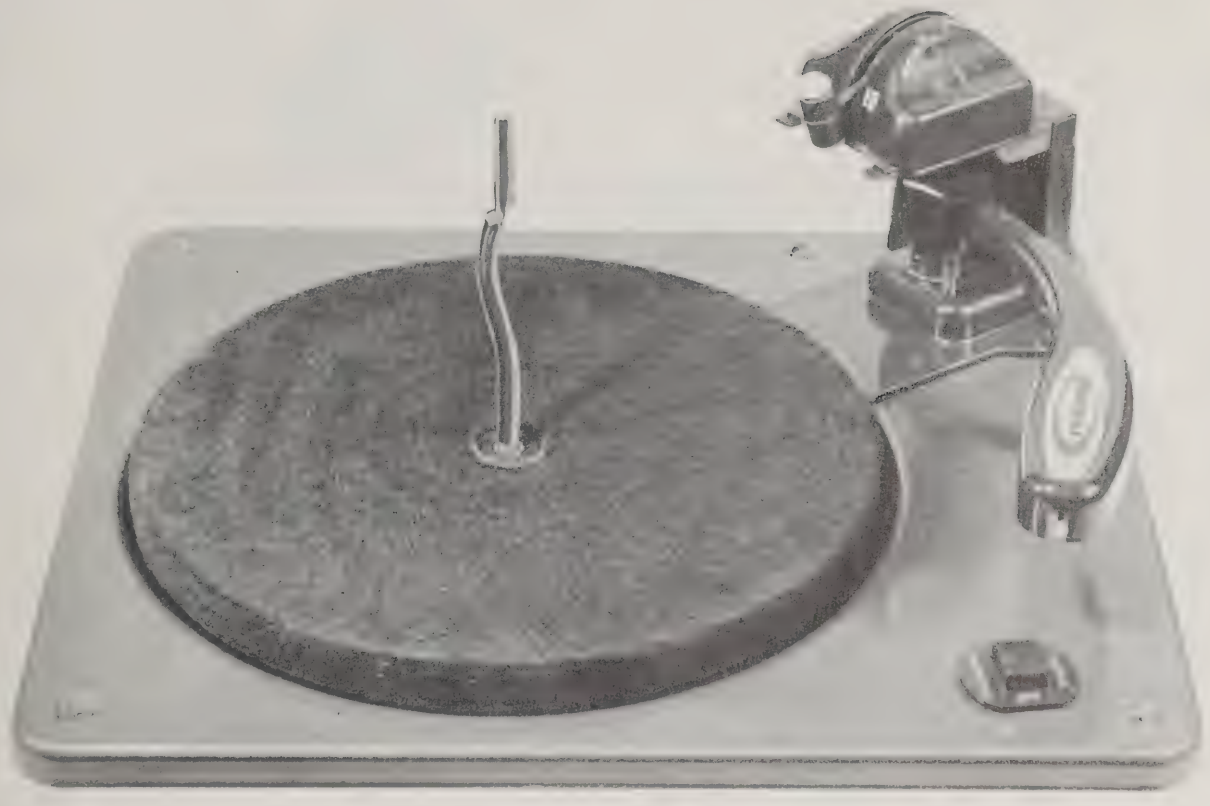


FIG. 1—TOP VIEW

CRESCENT
350 SERIES

CRESCENT
350 SERIES

GENERAL INFORMATION

The Crescent 350 Series Changer is of the single-post type. It is designed to play and automatically change up to ten 12-inch or twelve 10-inch records, not intermixed. The last record will be repeated until the changer is turned off. Manual operation is provided for playing non-standard and home recordings.

Motors may be supplied for 105-125 volts, 50 or 60 cycles, and 220 volts, 50 or 60 cycles.

Manufactured by

CRESCENT INDUSTRIES, INC., 4132-54 WEST BELMONT AVENUE, CHICAGO 41, ILL.

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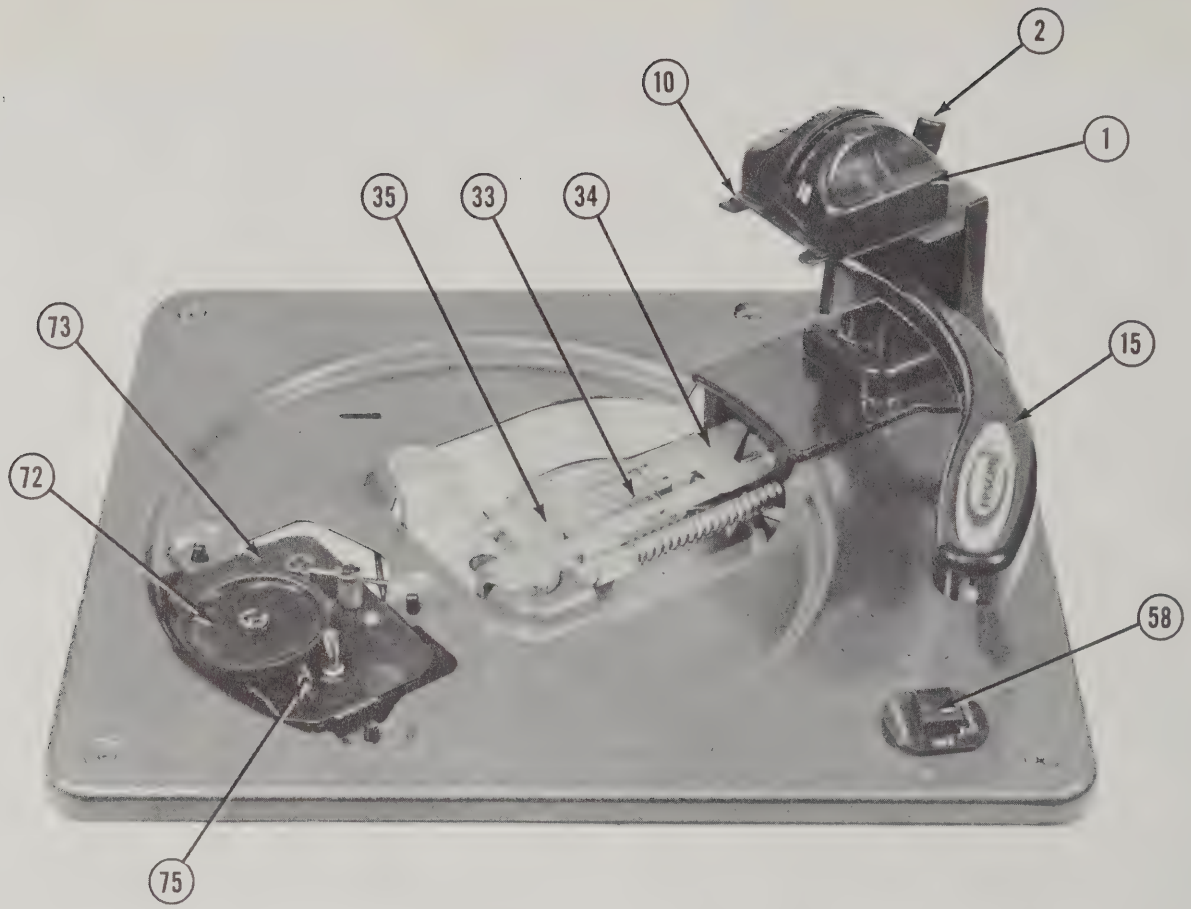

FIG. 2—TOP VIEW LESS TURNTABLE

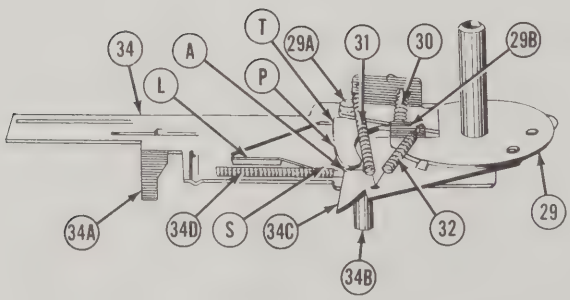

FIG. 3—ARM CONTROL ASSEMBLY

AUTOMATIC OPERATION

1. Turn the record support and cover assembly to the correct record size. This is indicated by the numbers stamped on the cover.

To change the setting from 10-inch to 12-inch, rotate the assembly *counterclockwise only* until it snaps into position. To change from 12-inch to 10-inch setting, rotate the assembly *clockwise only.*

2. Move the hold-down arm (2) away from the spindle.

3. Place up to ten 12-inch or twelve 10-inch records on the step of the spindle allowing them to rest on the record support. Do not intermix 10-inch and 12-inch records.

4. Set the hold-down pad (3) so that it rests on the top record.

5. Move the control knob (58) to the "Auto.-On" position. This sets the record changer for automatic operation and starts the turntable rotating.

6. Press down on the reject button (54), which is located on top of the arm rest, or push down on the pickup arm momentarily if it is setting on the rest. The changer will now play the entire stack of records.

7. A record may be rejected anytime, while playing, by pressing the reject button.

8. To shut the changer off, it is advisable to have the mechanism out of cycle. Place the pickup arm on its rest and move the control knob to the "Off" position.

9. Remove the records.

MANUAL OPERATION

1. Set record support and cover assembly to size of record to be played.

2. Place record on the turntable.

3. Move control knob to "Manual-On" position.

4. For standard 10 and 12-inch records, press down on the reject button or the pickup arm momentarily if it is setting on the arm rest.

For non-standard records and home recordings, place the pickup arm on the record manually.

5. After the record has been played, raise the pickup arm from the record and place it on the arm rest.

6. Move the control button to the "Off" position and remove the record.

CHANGE CYCLE

As the pickup arm moves into the eccentric groove of the record, the arm control pin (29A) of the arm control assembly (29) moves off the track (P) into the recess (T) of the arm control plate (34). This allows the arm control plate to slide toward the centerpost, which is actuated by the trip spring (33). As the control plate slides forward, the stop tap (34A) is moved from behind the reject catch (38) of the eccentric cam (40). The eccentric cam, now free to move, is pulled over by the eccentric cam spring (50) until the rubber tire makes contact with the knurled roller (45). The knurled roller, which rotates with the turntable, rotates the eccentric cam; this, in turn, forces the riser plate

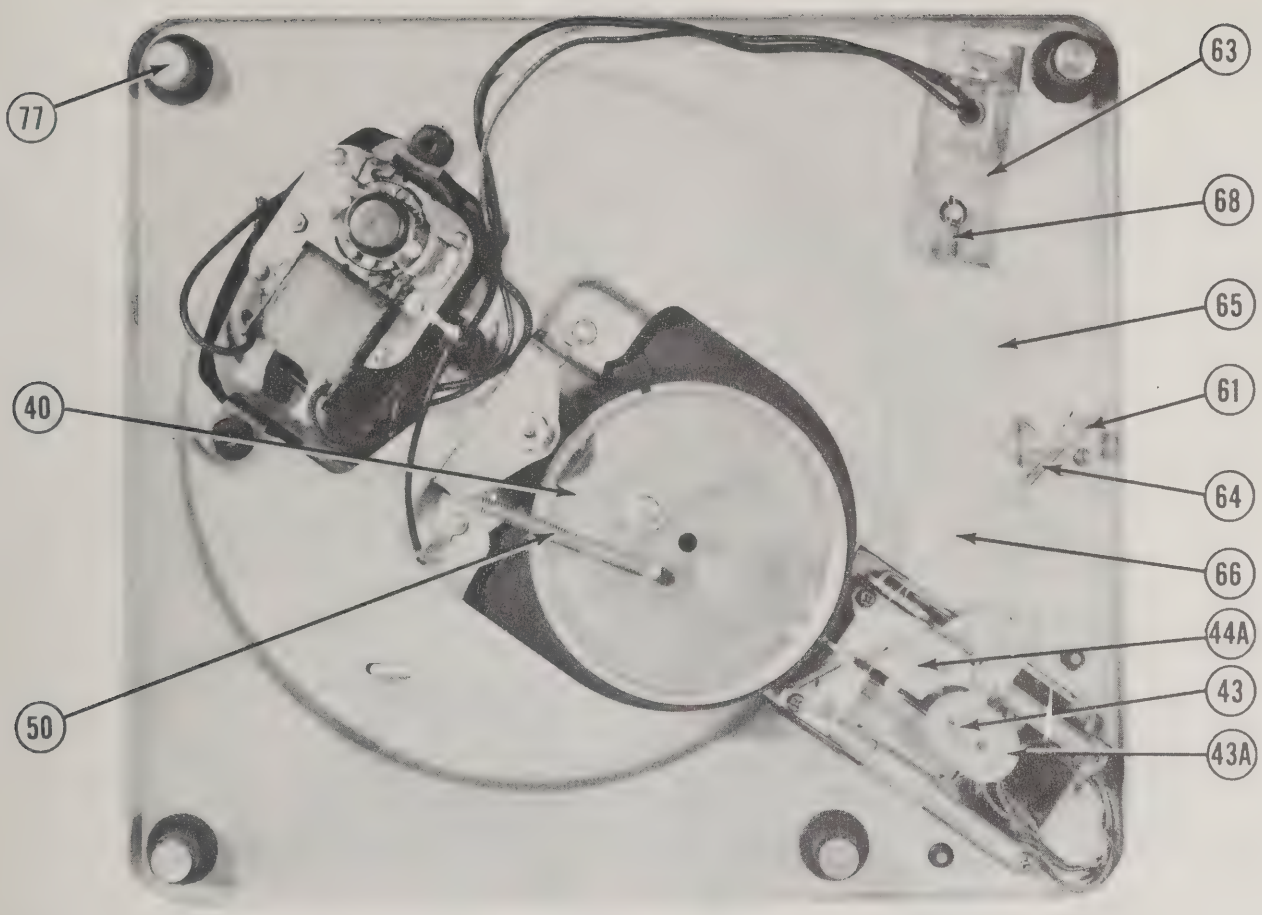

FIG. 4—BOTTOM VIEW

(35) back along its guide rods away from the centerpost.

As the riser plate travels backward, the push-off cam and shaft assembly (43) rides along the incline track (35A) of the riser plate (35). This causes the push-off cam and shaft assembly to be pulled down; and, as a result, the pickup arm lift pin (16) is pulled against the lift bearing pin of the pivot spring (17), causing the pickup arm to be raised clear of the records.

The riser plate tab (35B) contacts the cushion lever (34C) of the control plate, moving the control plate back until the size change stop (34B) contacts the radius of the push-off cam (43A).

The riser plate tab (35B) now contacts and moves the arm control assembly (29). Since the pickup arm support assembly (21) is fastened to the control assembly, the pickup arm is pivoted out clearing the edge of the record.

As the riser plate assembly (35) continues backward along the guide, the riser plate motion bracket (35C) contacts the arm of the push-off cam (43A), rotating the cam and shaft assembly (43); therefore, the push-off arm (4), which is connected to the push-off cam and shaft assembly, actuates the push plate, dropping a record to the turntable.

At this point, the riser plate assembly (35) starts to move back toward the centerpost, due to the rotation of the eccentric cam (40) and pressure of the recoil spring (36).

As the riser plate moves forward, the push plate spring (11) returns the push plate (10), push-off arm (4), and the push-off cam and shaft assembly (43) to their normal position.

The set-down spring (31), pulling on the arm control assembly (29), now moves the pickup arm in for set down.

The riser plate has now traveled far enough toward the centerpost to allow the push-off cam and shaft assembly (43) to ride down the inclined track (35A) of the riser plate. This lowers the pickup arm to the record.

The eccentric cam completes its rotation by the aid of the spring (50). This moves the tire away from the knurled roller (45) of the turntable shaft. The reject catch (38) comes to a rest against the stop tab (34A) of the arm control plate (34) and the reject arm (44B). This completes the change cycle.

Description of the Set-Down Points

The set-down points of the pickup arm are determined by the distance the arm control plate (34) travels as the riser plate (35) moves away from the centerpost. The distance the arm control plate travels is governed by the position of the push-off cam and shaft assembly (43), which is fastened to the push-off cam assembly (4); therefore, when the head assembly is turned to the 10-inch position, the push-off cam (43A) presents its short radius to the size change stop (34B). Through further motion of the riser plate (35) and the arm control plate (34), the arm control pin (29B) will ride along the "L" portion of the control track, setting the position for 10-inch set down.

With the head assembly in the 12-inch position, the long radius of the cam (43A) is presented to the size change stop (34B); as a result, the arm control pin (29B) will ride in the "S" portion of the arm control plate, setting the mechanism for 12-inch set down.

As the pickup arm moves back toward the record during the second half of the cycle, it will be stopped directly above the set-down point when the bracket (29B) of the arm control assembly reaches the adjusting screw (30). How far the arm moves in before being stopped depends on whether the arm control pin has been riding in the "S" or the "L" portion of the control track (see Figure 3).

Operation of Reject Mechanism

When the reject button (54) is pressed, it causes the reject lever (61) to pull the trigger wire (66), which, in turn, pulls the reject arm (44B) from behind the reject catch (38). This trips the eccentric cam, allowing it to engage the knurled roller (45) starting the change cycle.

Operation of Manual Mechanism

When the control knob is moved to the "Manual" position, it swings the switch mounting assembly (63) to the left. This causes the control wire (65) to pivot the manual control bracket (44A) in the path of the size change stop (34B). This action blocks the motion of the control plate,

A PHOTOFACT "EXPLODED" VIEW

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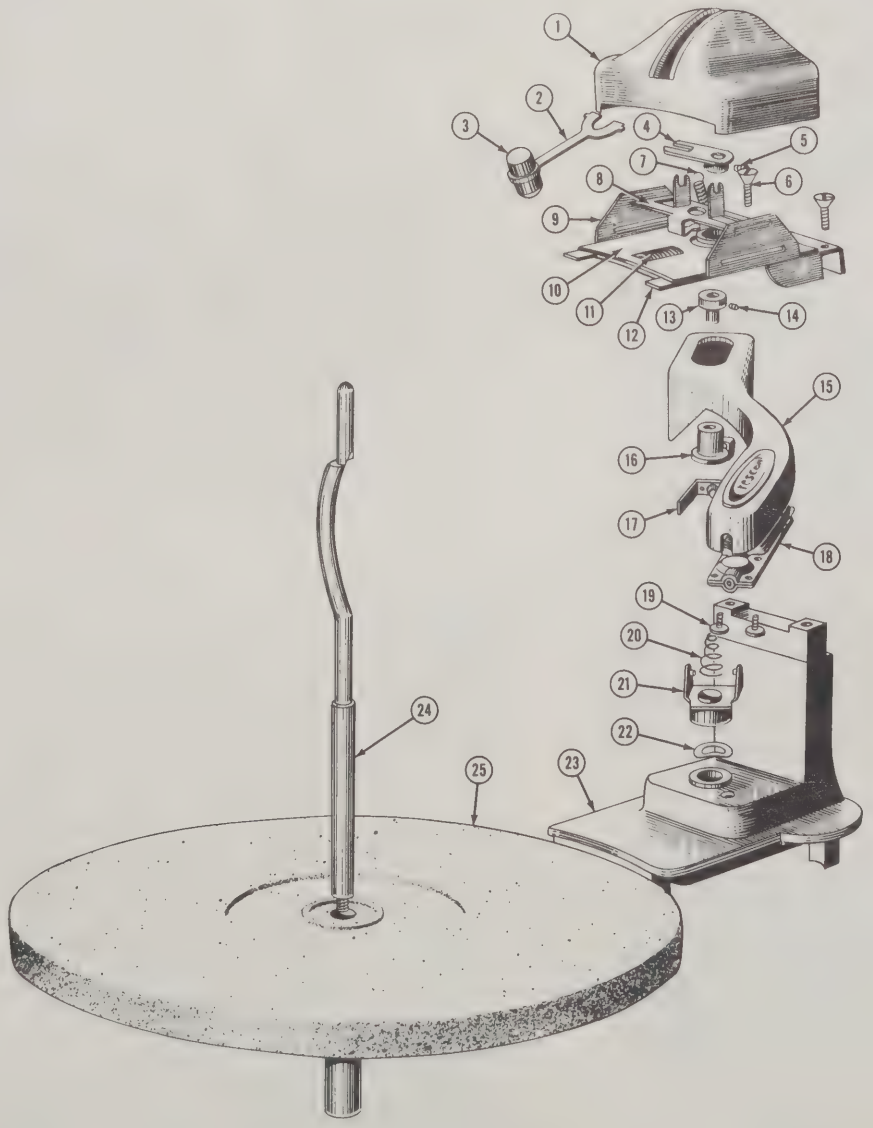

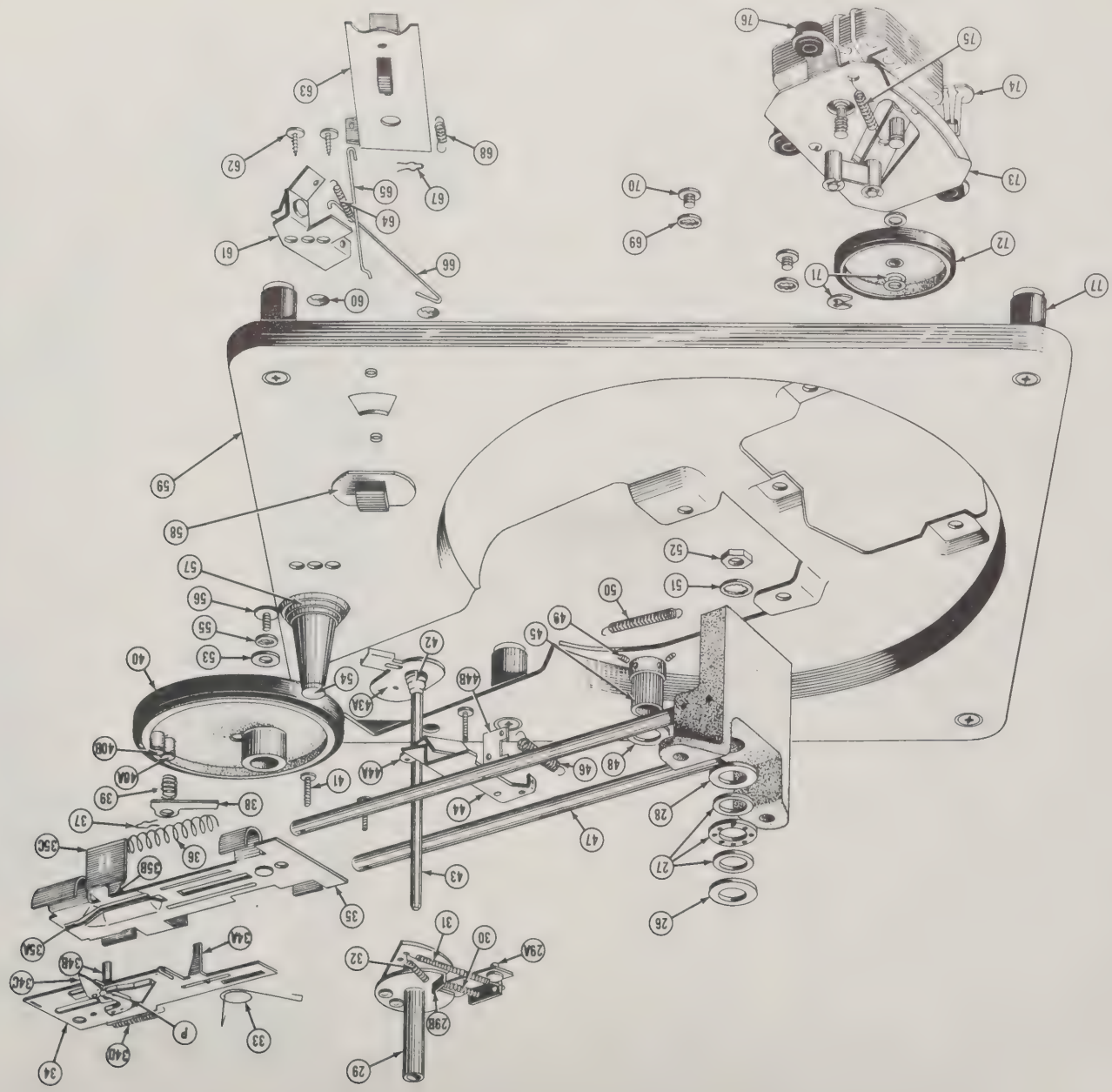
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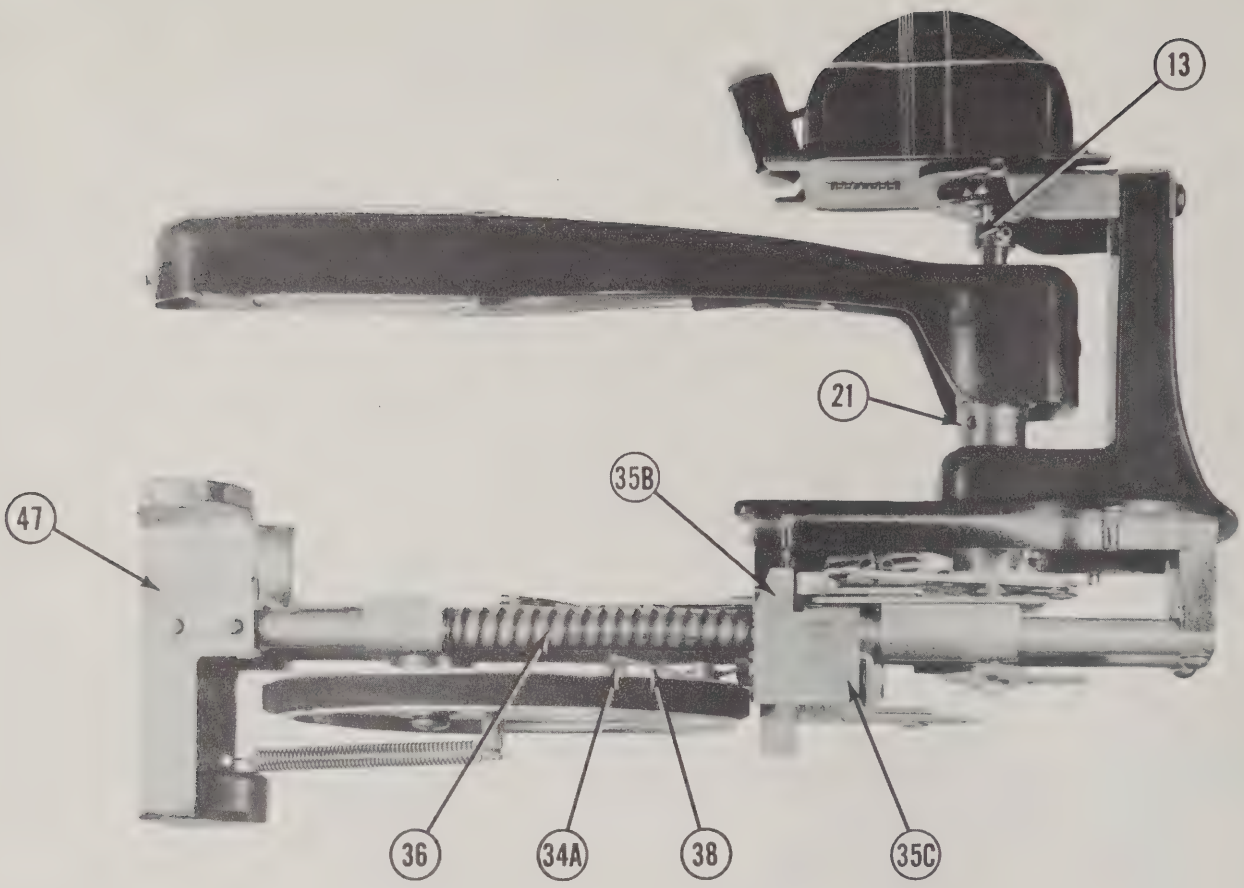

FIG. 5—CHANGE MECHANISM—RIGHT SIDE VIEW

preventing the eccentric cam from being tripped when the pickup arm moves into the eccentric groove. However, the mechanism may be tripped while the control is in "Manual" position by pressing on the reject button (54).

ADJUSTMENTS

Set Down and Trip Point

This changer is designed so that the 10-inch set down, the 12-inch set down, and the trip point are simultaneously adjusted in a single operation. It is recommended that the adjustment be made at either of the set-down points. The adjustment is made by the adjusting screw (30). Turning this screw counterclockwise will cause the pickup arm to set down closer to the centerpost; turning it clockwise will cause the arm to set down further away from the centerpost.

Repositioning of Pickup Arm Support Assembly

If the set screws in the pickup arm support (21) are loose, or if the pickup arm support assembly has been removed, the following adjustment should be followed for proper set down:

1. Turn the adjusting screw (30) clockwise two full turns.
2. Place a 12-inch record on the turntable.
3. Loosen the two set screws in the pickup arm support assembly (21).
4. With the changer out of cycle, move the arm control assembly (29) outward as far as it moves freely. In this position, the arm control pin (29A) will be located at point "A" on the track of the arm control plate (34) (see Figure 3).
5. Place the pickup arm so that the needle rests in the first playing groove of the record.
6. Tighten the two set screws in the pickup arm support assembly (21).
7. Make the final set-down adjustment as described in ADJUSTMENTS of "Set Down and Trip Point."

Removing Cover (1) from Head Assembly

1. To remove the cover from the head assembly, squeeze the cover at the ends and lift up enough for cover to be free of the rotating plate (12).
2. Remove the hairpin clip from the hold-down plate (8) and remove the plate.

Repositioning of Push-Off Arm

If the set screws (5) in the push-off arm (4) are loose, or if the push-off arm has been removed, it may be adjusted as follows:

1. Rotate the record support to the 10-inch position. Remove the cover (1) as described in paragraph "Remove Cover from Head Assembly."
2. Loosen the set screws (5) in the push-off arm (4).
3. Line up the arm of the push-off cam (43A) so that it is parallel with respect to the push-off arm (4). The small radius of the push-off cam (43A) should be pointing toward the centerpost.
4. Tighten the set screws (5), leaving about 1/32" between the push-off arm (4) and the top of the arm lift shaft.
5. Check the adjustment using 10 and 12-inch records.
6. If the record dropping is still faulty, set the push-off cam (43A) slightly back of the push-off arm (4); this will give a little less push on the 10-inch side and a little more on the 12-inch side. Reverse this procedure for more push-off on the 10-inch side.

Pickup Arm Height

The height of the pickup arm depends on the location of the lift adjusting collar (13); the arm should clear the record by about 1/32" without a needle and with a single record on the turntable.

The pickup arm height may be made as follows:

1. The changer should be out of cycle.
2. Place a single record on the turntable.
3. Remove the needle and place the pickup arm on the record.

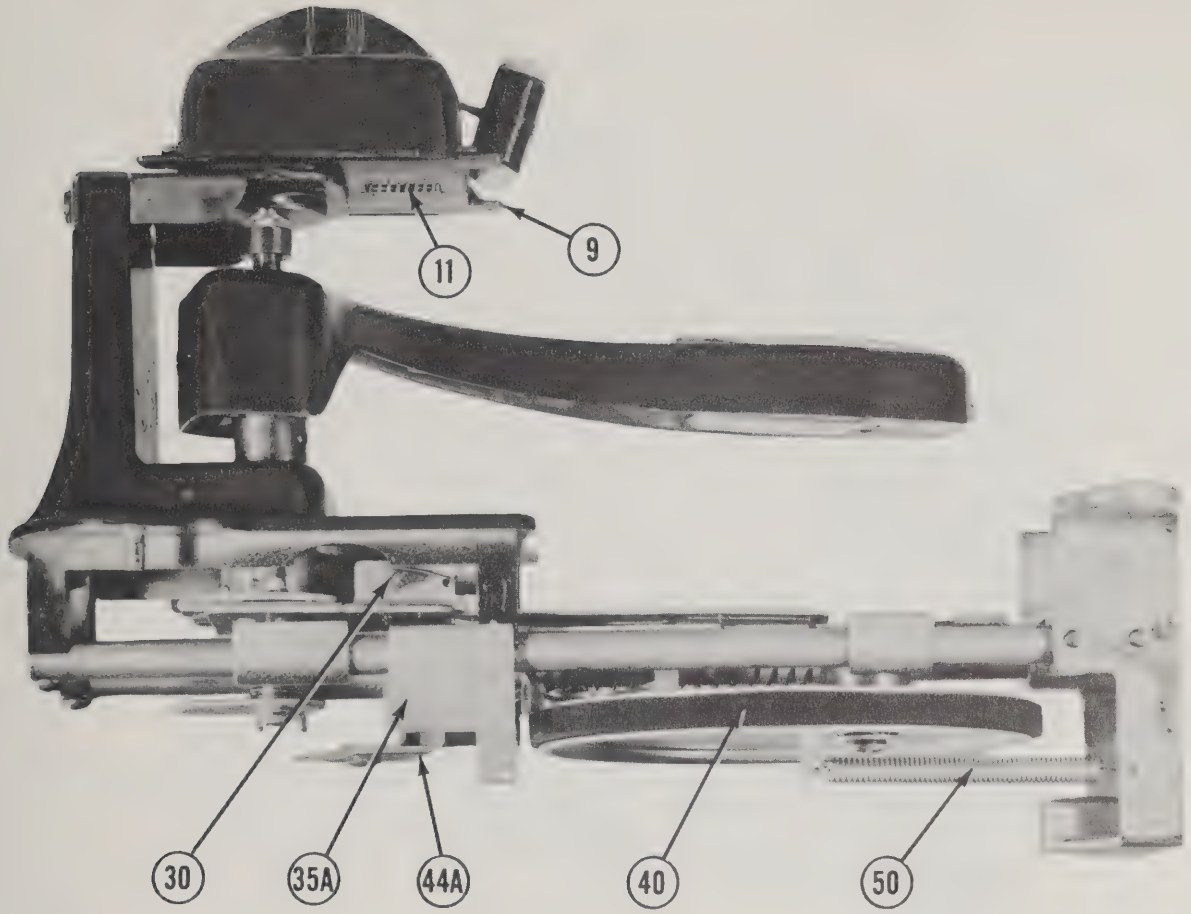

FIG. 6—CHANGE MECHANISM—LEFT SIDE VIEW

4. Loosen the set screw (14) in the lift adjusting collar (13).

5. Take up all play by pushing up on the push-off cam and shaft assembly (43). Do not compress the arm lift shaft spring (42).

6. While holding the cam and shaft assembly in this position, slide the lift adjusting collar (13) down until it is snug against the pickup arm lift (16).

7. Tighten the set screw (14).

8. Check this adjustment. If still incorrect, it may be necessary to repeat the adjustment. Before doing so, check the shaft (43) for nicks and burrs made by the set screw.

Removal of Turntable

Before the turntable can be removed, it is first necessary to remove the centerpost. This is done by removing the centerpost nut (52) and the lock washer (51). The knurled roller (45) is then loosened from the turntable shaft by loosening the set screws (49). The turntable and centerpost may now be removed by pulling upward.

TROUBLES

Failure to Trip on Completion of Record

1. Trip spring (33) broken or too weak to actuate the arm control plate (34).

2. Check the eccentric cam (40) to see if it contacts the knurled roller (45) when it is tripped. If the cam does not contact the roller, it may be due to a broken or stretched cam spring (50), or tightening at cam pivot.

Continuous Tripping

1. Reject arm (44B) binding in an outward position, thereby not blocking the reject catch (38) at the end of the change cycle.

2. Reject catch (38) bent; as a result, catch may pass under the stop tab (34A) or the reject arm (44B).

3. Spring (39) not holding the reject catch (38) up properly.

Pickup Arm Fails to Set Down Properly

1. Set screw in the pickup arm support (21) loose. See "Repositioning of Pickup Arm Support Assembly" under ADJUSTMENTS.

2. Set screw (14) of the lift adjusting collar (13) loose.

3. Screw (30) out of adjustment. See "Set Down and Trip Point" under ADJUSTMENTS.

Records Fail to Drop to the Turntable

1. Set screw (5) of the push-off arm (4) loose. See "Repositioning of Push-Off Arm" under ADJUSTMENTS.

Turntable Speed Irregular

1. Grease on the rim of the turntable and rubber tire of the idler wheel. Clean with naphtha.

Stalls During the Change Cycle

1. Grease on the turntable rim.

2. Check parts for binding.

3. If turntable rotates but changer mechanism stalls, check the knurled roller (45) to see if it is securely fastened to the turntable hub.

LUBRICATION

Factory lubrication should be sufficient for a long period of time; however, should the mechanism require lubrication, use S.A.E. No. 10 motor oil on the turntable bearings. Use a good, light grease on the guide rods and all other points of frictional contact.

CAUTION: Do not allow oil or grease to come in contact with the rubber surfaces of the eccentric cam, idler wheel, or the turntable rim.

PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1	2C3-B2	Cover
2	2C3-A1	Hold down arm
3		Rubber bumper
4	G400-A66	Push-off arm assembly
5	1A44-37	Set screw (bristol head #6-32 x 1/8")
6	6C-312	Screw (#6 x 5/16" Phillips flat head type Z)
7	405-A4	Hold down spring
8	2C1-A14	Hold down plate
9	C250-A3	Head assembly
10		Push plate (part of 9)
11	405-A33	Push plate spring
12		Rotating plate (part of 9)
13	402-A57	Lift adjusting collar
14	1A44-38	Set screw (bristol head #6-32 x 3/16")
15	C250-A8	Pickup arm, pivot spring and arm lift bearing pin assembly
16	G400-A86	Pickup arm lift assembly
17		Pickup arm pivot spring, Arm lift bearing pin, Rivet for pivot spring — Sup. as a group. Order part No. C250-A9
18	409-A1	Pickup cartridge
	409-A2	Pickup cartridge — Interchangeable
	409-A3	Pickup cartridge
19	42-250	Cartridge mounting screw (fil. H.M.S. #4-40 x 1/4")
20	405-A46	Brake spring
21	G400-A73	Pickup arm support assembly
22	405-A27	Spring washer
23	2C4-C1	Pickup arm base
24	G400-B21	Centerpost
25	C250-B13	Turntable
26	412-A1	Cork washer
27	415-A2	Thrust bearing assembly (replace as a unit)
28	412-A9	Cork washer
29	C250-A10	Arm control assembly
29A		Arm control pin (part of 29)
29B		Bracket (part of 29)
30	402-A60	Adjusting screw
31	405-A49	Set-down spring
32	405-A41	Safety spring
33	405-A43	Trip spring
34	C250-A11	Arm control plate
34A		Stop tab (part of 34)
34B		Size change stop (part of 34)
34C	405-A45	Cushion spring
35	C250-A12	Riser plate assembly
35A		Inclined track (part of 35)
35B		Riser plate tab (part of 35)
35C		Riser plate motion bracket (part of 35)
36	405-A9	Recoil spring
37	405-A15	Hairpin spring
38	2C1-A8	Reject catch
39	405-A50	Reject catch support spring
40	G400-A117	Eccentric cam and tire assembly
	406-A1	Eccentric cam rubber tire only
40A		Reject catch pivot stud (part of 40)
40B		Reject catch stop stud (part of 40)
41	6C-625	Screw (#6 x 5/8 fil. head type Z)
42		Arm lift shaft spring (part of 43)
43	G400-A98	Push-off cam and shaft assembly (includes retaining ring, safety collar, and spring)
43A		Push-off cam (part of 43)
44	C250-A6	Reject manual control assembly
44A		Manual control bracket (part of 44)
44B		Reject arm (part of 44)
45	2C2-A1	Knurled roller, turntable shaft
46	405-A25	Reject arm spring
47	C250-B14	Turntable mounting and guide rod assembly
48		Cork washer
49	1A44-13	Set screw (bristol head #8-32 x 1/8")
50	405-A47	Eccentric spring
51	3B1-29	Lockwasher, 1/4" I.D.
52	402-A41	Hex nut (1/4"-20)
53	4B1-57-47	Flat washer (eccentric cam)
54		Reject button (part of 57)
55	3B1-26-47	Lockwasher #8 I.T.
56	84-250	Screw (B.H.M.S. #8-32 x 1/4")
57	C250-A15	Arm rest assembly
58	2C3-B3	Control knob
59	C250-B2	Base plate
60	2C5-A5	Faston washer
61	C250-A16	Reject lever assembly
62	1A20-14-21	Screw (#6 x 3/8" drive screw)
63	C250-A5	Switch mounting assembly
64	405-A25	Reject lever spring
65	2C14-A2	Manual control wire
66	414-A13	Reject trigger wire
67	405-A15	Hairpin spring
	405-A22	Spring washer (for switch mounting assembly)
68		Main control spring
69		Lockwasher
70		Mounting screw (8-32 x 1/4")
71		"C" washer
		Fiber washer
72	G400-A57	Idler wheel assembly (used with motor 407-B1 only)
	G400-A59	Idler wheel assembly (used with motor 407-B10 only)
	C250-A17	Idler wheel assembly (used with motor 407-B9 only)
73	407-B1	Motor, complete with idler wheel; 105-125 volts, 60 cycle (motors 407-B9, 407-B10 are interchangeable with 407-B1)
	407-B6	Motor, complete with idler wheel; 105-125 volts, 50 cycle (motors 407-B7, 2C7-B1 are interchangeable with 407-B6)
	2C7-B2	Motor, complete with idler wheel; 220 volts, 60 cycle (motors 2C7-B4, 2C7-B6 are interchangeable with 2C7-B2)
	2C7-B3	Motor, complete with idler wheel; 220 volts, 50 cycle (motors 2C7-B5, 2C7-B7 are interchangeable with 2C7-B3)
74	2C5-A3	Motor snap fastener
75	405-A35	Spring, idler wheel (used with motor 407-B1 only)
	405-A36	Spring, idler wheel (used with motor 407-B10 only)
	2C5-A6	Spring, idler wheel (used with motor 407-B9 only)
76		Motor mounting grommet
77	2C6-A3	Rubber shock mount
	2C2-A5	Motorboard mounting stud
	4B1-72	Flat washer, #10 I.D.
	100-500	Screw (Phillips countersunk flat head)

CROSLEY MODELS
10-307M, 10-308, 10-309

CROSLEY MODELS
10-307M, 10-308, 10-309

CROSLEY MODEL 10-307M

TRADE NAME	Crosley, Models 10-307M, 10-308, 10-309
MANUFACTURER	Crosley Corp., 1329 Arlington St., Cincinnati, Ohio
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types 1R5 Converter, 1T4 1st IF Amp., 1U4 2nd IF Amp., 1U5 DET-AVC-AF, 3V4 Power Output.
POWER SUPPLY	110-120 Volts AC-DC or 9 Volts "A" Supply and 90 Volts "B" Supply in Pack Form
RATING	.16 Amp. @ 117 Volts AC or 46MA @ 9 Volts DC and 11MA @ 90 Volts DC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Connect a 33KΩ resistor between pin 1 and 6 of the convertor tube (V1) socket.
Use battery power when available. If AC power is used, the use of an isolation transformer is recommended.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF .05MFD	High side thru 200MMF to pin 1 (Grid) of 1R5 (V1). Low side thru .05MFD to B-.	455KC (400~ Mod.)	Tuning gang fully open	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2.	"	"	1620KC	"	"	A5	"
3.		Loop	1400KC	Tune for max. output	"	A6	Remove the 33KΩ resistor. Replace the set in cabinet and connect the loop antenna. Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Set dial pointer to 1400KC on dial.

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PARTS LIST AND DESCRIPTIONS

CROSLEY
MODEL 10-307M

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CROSLEY PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	1R5	1R5	7AT	
V2	1st IF Amp.	1T4	1T4	6AR	
V3	2nd IF Amp.	1U4	1U4	6AR	
V4	DET-AVC-AF	1U5	1U5	6BW	
V5	Power Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: CROSLEY PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150	B-145261	PRSA86D4A	EDL5315C		TA-307	Filter Red
B	30	150		SRE12/200	BRH1225		UHC-212	Filter Blue
C	30	25						Filament Bypass Green
D	200	10						Filament Bypass Yellow
C2	50		C-137727-21	1468-00005	5W5Q5	GP1K-50	1FM-45	Osc. Grid Cap.
C3	.1	200	39001-19	P288-1	GT2P1		TM-1	Decoupling
C4	.1	200	39001-19	P288-1	GT2P1		TM-1	AVC Filter
C5A	200		B-144675-10	1468-0002	5W5T2	GP2K-200	34C4	Diode RF Filter
B	2000			P688-002	GT6D2	GP2M-002		Audio Coupling
C	5000			P688-005	GT6D5	GP2M-005		AF Amp. Screen Bypass
D	100			1468-0001	5W5T1	GP1K-100		AF Amp. Plate Bypass
E	4000			P688-004	GT6D4	GP2M-0047		Audio Coupling
C6	.003	600	39001-76	P688-003	GT6D3	GP2M-003	TM-23	Output Plate Bypass
C7	.1	200	39001-19	P288-1	GT2P1		TM-1	Filament Bypass
C8	.005	600	39001-11	P688-005	GT6D5	GP2M-005	TM-25	IF Coupling
C9	.08	200	39001-17	P288-075	GT2P1		72P52	Line Isolation
C10	.05	200	39001-17	P288-05	GT2S5		TM-15	Line Filter
C11	.05	200	39001-65	P288-05	GT2S5		TM-15	RF Bypass

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: CROSLEY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	39368-14	Q13-137	AM-63-Z	Volume control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions
C	Switch		39369-2	76-2	SW-A2	Attach to R1A per instructions

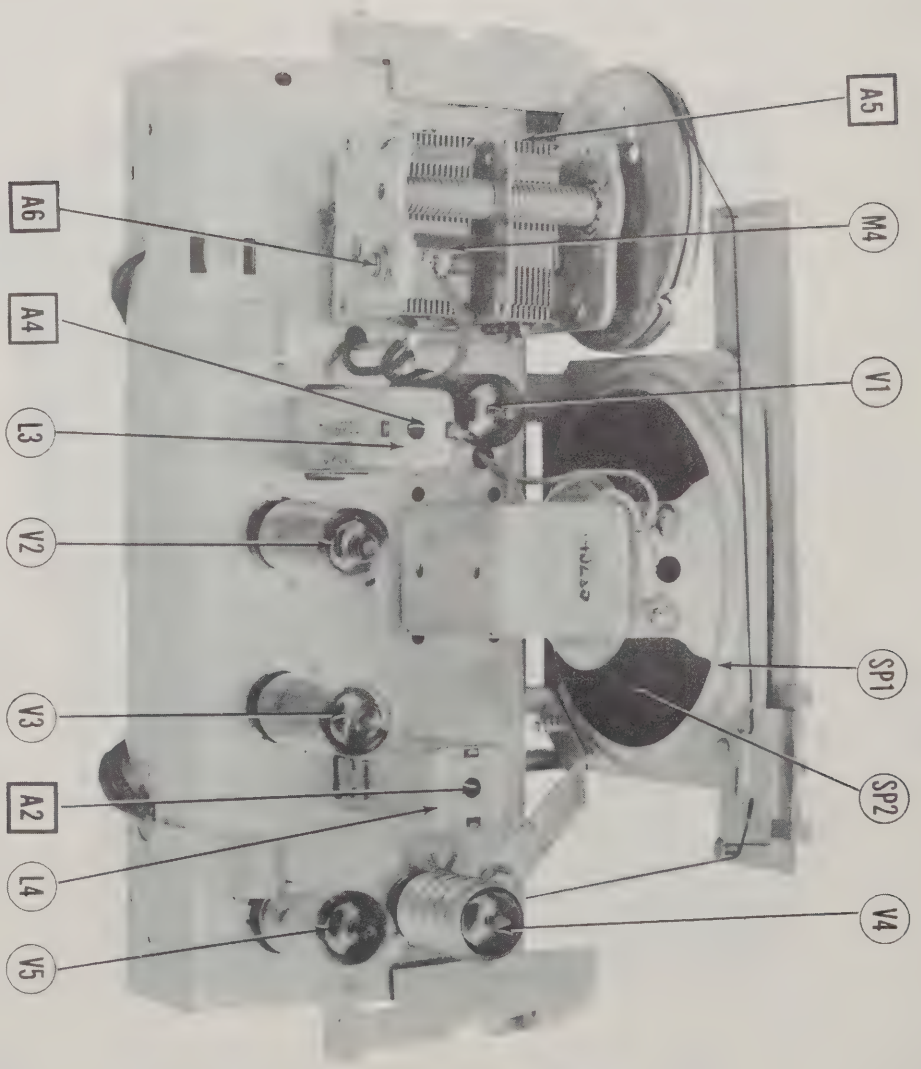
RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: CROSLEY PART No.	IRC PART No.	IDENTIFICATION CODES
R2	100KΩ	½	39373-74	BTS-100K	Osc. Grid
R3	22KΩ	½	39373-60	BTS-22K	Screen Dropping
R4	3.3 Meg.	½	39373-100	BTS-3.3 Meg.	AVC Network
R5	10KΩ	½	39373-54	BTS-10K	1st IF Plate
R6	2.2 Meg.	½	39373-97	BTS-2.2 Meg.	2nd IF Grid
R7	150KΩ	½	39373-77	BTS-150K	Diode Filter
R8	10 Meg.	½	39373-107	BTS-10 Meg.	AF Grid
R9	4.7 Meg.	½	39373-102	BTS-4.7 Meg.	AF Screen
R10	560KΩ	½	39374-58	BTS-560K	AF Plate
R11	1200Ω	½	39374-26	BTS-1200	Filament String
R12	1 Meg.	½	39373-92	BTS-1 Meg.	Output Grid
R13	820Ω	½	39374-24	BTS-820	Filament String
R14	2200Ω	½	39373-40	BTS-2200	Filament String
R15	2200Ω	½	39373-40	BTS-2200	Filter
R16	2220Ω	7	B-144857-4	AB-2250	Filament Dropping, (Wire Wound)
R17	82Ω	2	39374-188		Surge Limiter

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA: CROSLEY PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T1	10.2 KΩ	4.2Ω	890Ω	.5Ω	138131-3	A-3329	A-2932	RO-16	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: CROSLEY PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-113		
SP1	PM	4.2Ω	139631	MOD.P4-X	4A07	
	CONE DIA.	V. C. DIA.				
SP2	3 7/8"	9/16"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CROSLEY PART No.	REPLACEMENT DATA: MEISSNER PART No.
L1	Loop Ant.	2.5Ω		AC-145385	
L2	Osc. Coil	2.6Ω	7.5Ω	AW-145006	14-1060
L3	1st IF	20Ω	20Ω	AC-139919-2	16-6668
L4	2nd IF	20Ω	20Ω	AC-139919-2	16-6669

SELENIUM RECTIFIER

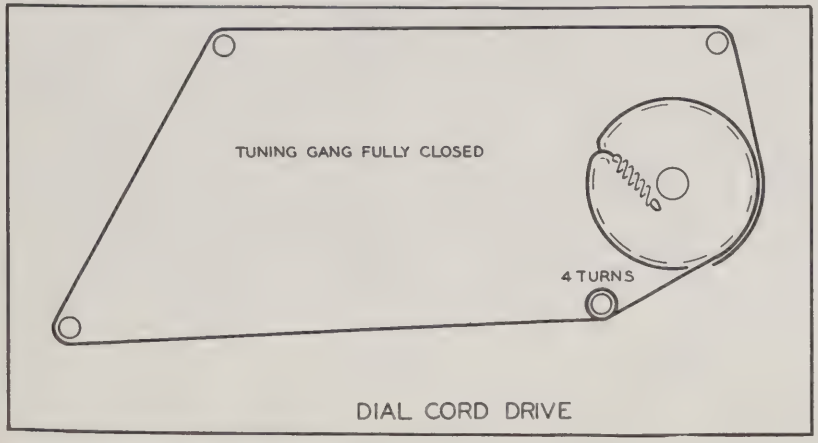
ITEM No.	RATING: CURRENT	REPLACEMENT DATA: CROSLEY PART No.	REPLACEMENT DATA: SYLVANIA PART No.		NOTES
M1	.065A	W-145429	NB-5		

BATTERIES

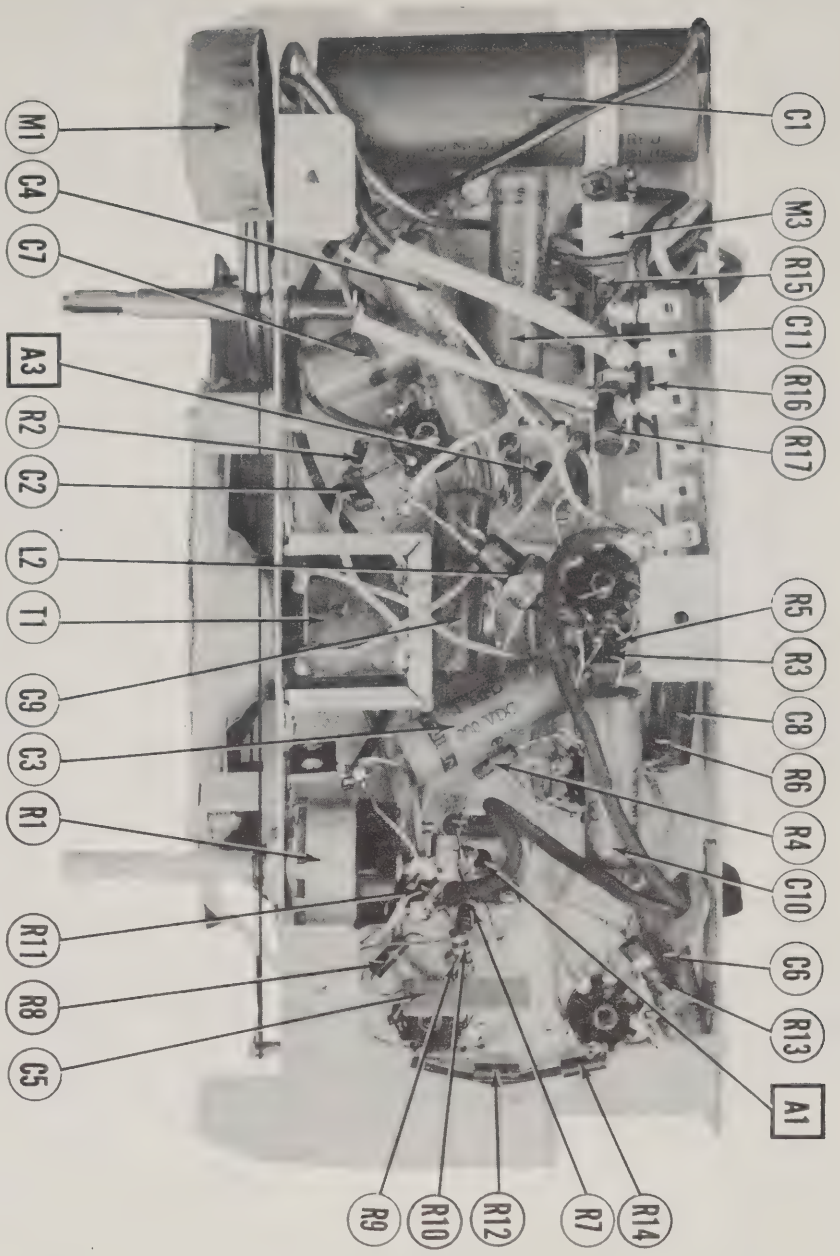
ITEM No.	VOLTAGE	CROSLEY PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M2	9 V "A" 90V "B"	CR94						T6Z60	

MISCELLANEOUS

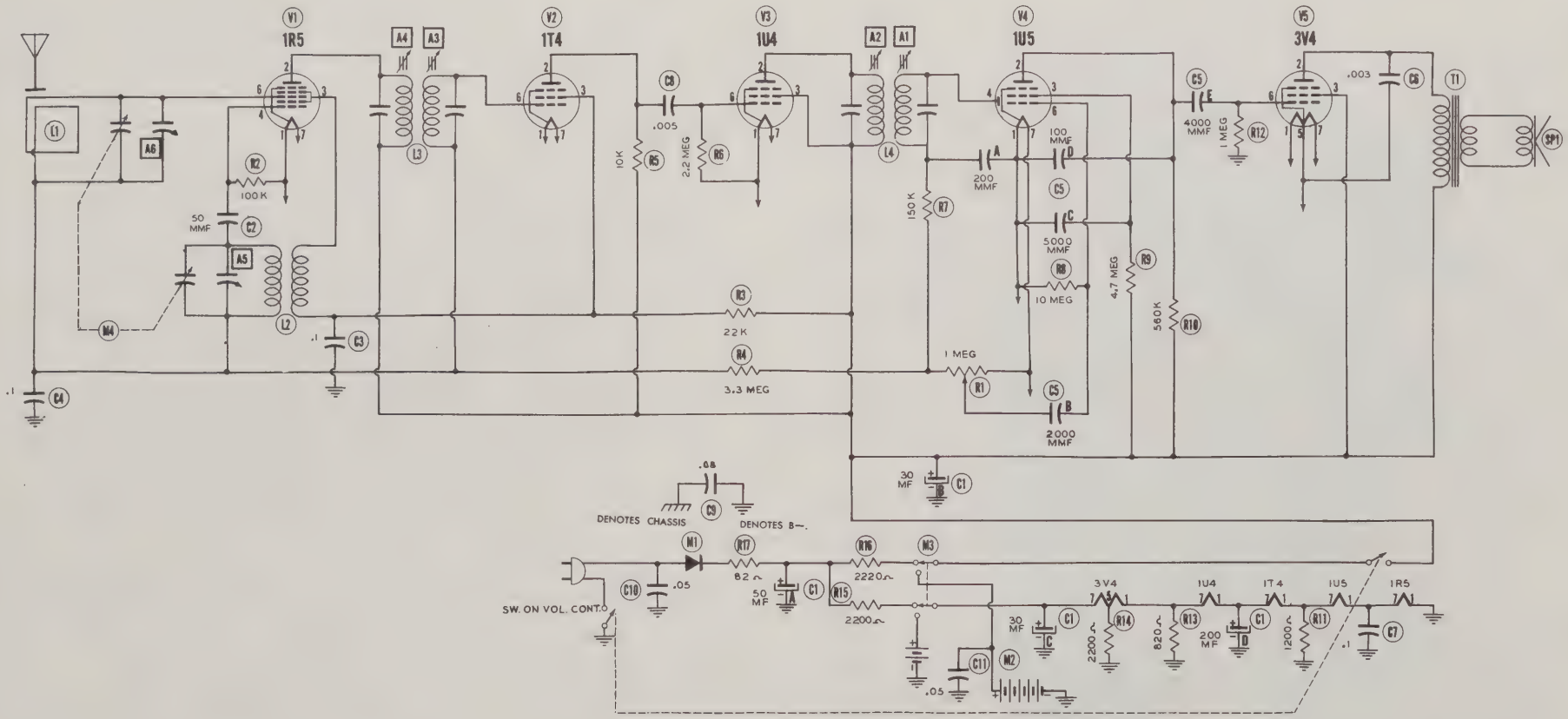
ITEM No.	PART NAME	CROSLEY PART No.	NOTES
M3	Switch	W-145233	AC/DC-Battery
M4	2 Gang Var.Cap.	AG-137073-38	(14-460MMF, 37-214MMF)
A6	Trimmer	C-136327-45	Ant. Adj.
	Dial Pointer	B-145259	
	Cabinet	AC-145369	Model 10-307M
	Cabinet	C-145224-3	Model 10-308
	Cabinet	C-145224-2	Model 10-309
	Knob	B-145121-2	Models 10-307M, 10-308
	Knob	B-145121-3	Model 10-309



CHASSIS—BOTTOM VIEW



CROSLEY
MODEL 10-307M



IF= 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	0V	90VDC	50VDC	§-7.7VDC	0V	0V	1.4VDC
V 2	1T4	2.8VDC	80VDC	50VDC	90VDC	2.8VDC	.1VDC	4VDC
V 3	1U4	4VDC	90VDC	90VDC	.1VDC	4VDC	.3VDC	5.4VDC
V 4	1U5	1.4VDC	28VDC	13VDC	.4VDC	0V	0V	2.8VDC
V 5	3V4	5.2VDC	84VDC	90VDC	0V	6.6VDC	0V	8VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†2.2KΩ	†24KΩ	100KΩ	*	4.3Meg.	*
V 2	1T4	*	†12KΩ	†24KΩ	12.2KΩ	*	4.3Meg.	*
V 3	1U4	*	†2.2KΩ	†2.2KΩ	4.3Meg.	*	2.2Meg.	*
V 4	1U5	*	†560KΩ	†4.7Meg.	1.1Meg.	0Ω	10 Meg.	*
V 5	3V4	*	†2.6KΩ	†2.2KΩ	0Ω	*	1 Meg.	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
† Measured from output of M1.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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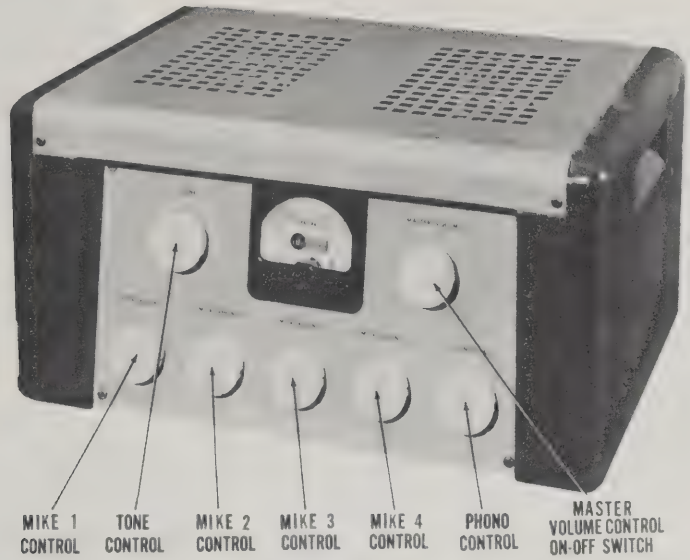
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



DAVID BOGEN MODEL HOL

TRADE NAME	David Bogen, Models HOH, HOL, LOH, LOL
MANUFACTURER	David Bogen Co., Inc., 663 Broadway, New York 12, New York
TYPE SET	AC Operated 5 Channel Audio Amplifier
TUBES(SEVEN)	Types 6SF5 Mic. #1 Pre Amp., 6SF5 Mic. #2 Pre Amp., 6SF5 Mic. #3 Pre Amp., 6SF5 Mic. #4 Pre Amp., 6SF5 1st AF Amp., 6SN7GT 2nd AF-Audio Output, 6X5GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING .24 Amp. @ 117 Volts AC

The Model HOH is a self-powered five channel mixer and pre-amplifier which mixes the outputs of four high impedance microphones and a phonograph pickup in any combination. Each input channel has its individual gain control. A master gain control is provided to adjust the level of the mixed program.

The Model HOL is the same as the Model HOH except for the addition of the following features: provision for zero level output terminating in multiple low impedance lines and a built-in db meter on the control panel used to indicate output level. The db meter is calibrated for "0" db. The output impedance may be changed without changing the calibration of the meter. Unless otherwise specified the low output impedance will be connected for 500 ohms.

The Model LOH is the same as the Model HOH except for the addition of low impedance input transformers. Unless otherwise specified they will be connected for 200 ohms input.

The Model LOL is the same as the Model HOL except for the addition of low impedance input transformers. Unless otherwise specified the Model LOL will be connected for 200 ohms input and 500 ohms output.

Input and output transformers may be reconnected for other line impedances as shown on the schematic.

CONNECTIONS: Shielded microphone connectors are located on the rear of the chassis and correspond in position to the controls on the front of the chassis. Both the high and low impedance output connectors are also located at the rear of the chassis. Shielded cable is required for both the input and output lines to prevent hum pickup.

Models HOH and LOH are designed to operate into the phonograph input of the main amplifier and Models HOL and LOL are designed to operate into a zero level line.

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DAVID BOGEN
MODELS HOH, HOL, LOH, LOL

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: DAVID BOGEN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Mic. #1 Pre Amp	6SF5	6SF5	6AB	
V2	Mic. #2 Pre Amp	6SF5	6SF5	6AB	
V3	Mic. #3 Pre Amp	6SF5	6SF5	6AB	
V4	Mic. #4 Pre Amp	6SF5	6SF5	6AB	
V5	1st AF Amp.	6SF5	6SF5	6AB	
V6	2nd AF-Audio Output	6SN7GT	6SN7GT	8BD	
V7	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: DAVID BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	150		AF844D	UP43215		EL-224	■ Filter
B	30	150						▲ Filter
C	10	150						Filter
C2	10	25		PRS25/10	BR102A		TVA-5	Filter
C3A	5	450		AF2222J	UP5Q45		EL-410	■ Decoupling
B	5	450						◓ Decoupling
C	5	450						▲ Decoupling
D	5	450						Decoupling
C4	100	25		PRS25/100	BRH251A		UHC-102	Cathode Bypass
C5	100	25		PRS25/100	BRH251A		UHC-102	Cathode Bypass
C6	100	25		PRS25/100	BRH251A		UHC-102	Cathode Bypass
C7	100	25		PRS25/100	BRH251A		UHC-102	Cathode Bypass
C8	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C9	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C10	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C11	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C12	.03	400		P488-03	GT4S3		TM-13	Cathode Bypass
C13	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C14	500	500		1468-0005	5W5T5	GP2K-500	1FM-35	Tone Comp.
C15	.002	600		P688-002	GT6D2	GP2M-002	TM-22	Tone Comp.
C16	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C17	1	400		484-1.0	GT4W1		TC-10	Audio Coupling
C18	.1	500		P488-1	GT6P1		TM-1	Line Filter
C19	.5	400		484-5	GT4P5		TC-5	1st AF Plate Decoupling

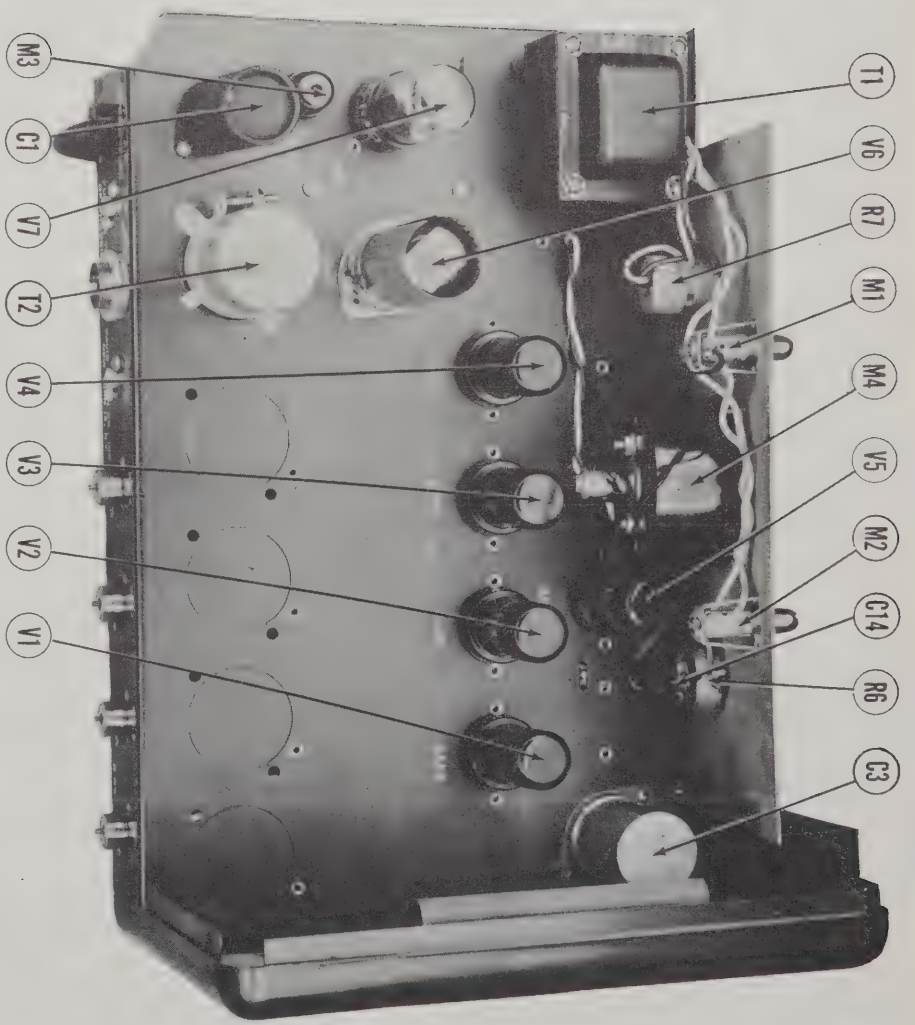
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: D. BOGEN PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	500KΩ	½	V-202A	Q13-133	M-60-Z	Microphone 1 Volume Control
R2	500KΩ	½	V-202A	Q13-133	M-60-Z	Microphone 2 Volume Control
R3	500KΩ	½	V-202A	Q13-133	M-60-Z	Microphone 3 Volume Control
R4	500KΩ	½	V-202A	Q13-133	M-60-Z	Microphone 4 Volume Control
R5	500KΩ	½	V-202A	Q13-133	M-60-Z	Phono Volume Control
R6	Inf.	½	V-129E			Tone Control, Tapped ② 60KΩ
R7A	500KΩ	½	V-149A	Q13-133	M-60-Z	Master Volume Control
B	Switch		Not Req.	76-1	SW-A	Attach to R7A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: DAVID BOGEN PART No.	IRC PART No.	IDENTIFICATION CODES
R8	500KΩ	½		BTS-470K	Mic. #1 Pre Amp. Grid
R9	4700Ω	½		BTS-4700	Mic. #1 Pre Amp. Cathode
R10	220KΩ	½		BTS-220K	Mic. #1 Pre Amp. Plate
R11	100KΩ	½		BTS-100K	Mic. #1 Pre Amp. Decoupling
R12	500KΩ	½		BTS-470K	Mic. #2 Pre Amp. Grid
R13	4700Ω	½		BTS-4700	Mic. #2 Pre Amp. Cathode
R14	220KΩ	½		BTS-220K	Mic. #2 Pre Amp. Plate
R15	100KΩ	½		BTS-100K	Mic. #2 Pre Amp. Decoupling

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	DAVID BOGEN PART No.	IRC PART No.	
R16	500KΩ	½		BTS-470K	Mic. #3 Pre Amp. Grid
R17	4700Ω	½		BTS-4700	Mic. #3 Pre Amp. Cathode
R18	220KΩ	½		BTS-220K	Mic. #3 Pre Amp. Plate
R19	100KΩ	½		BTS-100K	Mic. #3 Pre Amp. Decoupling
R20	500KΩ	½		BTS-470K	Mic. #4 Pre Amp. Grid
R21	4700Ω	½		BTS-4700	Mic. #4 Pre Amp. Cathode
R22	220KΩ	½		BTS-220K	Mic. #4 Pre Amp. Plate
R23	100KΩ	½		BTS-100K	Mic. #4 Pre Amp. Decoupling
R24	500KΩ	½		BTS-470K	Isolation
R25	220KΩ	½		BTS-220K	Isolation
R26	220KΩ	½		BTS-220K	Isolation
R27	220KΩ	½		BTS-220K	Isolation
R28	220KΩ	½		BTS-220K	Isolation
R29	3300Ω	½		BTS-3300	1st AF Cathode
R30	220KΩ	½		BTS-220K	1st AF Plate
R31	22KΩ	½		BTS-22K	1st AF Plate Decoupling
R32	8200Ω	½		BTS-8200	2nd AF Cathode
R33	220KΩ	½		BTS-220K	2nd AF Plate
R34	220KΩ	½		BTS-220K	2nd AF Grid
R35	1000Ω	½		BTS-1000	2nd AF Cathode
R36	15KΩ	½		BTS-15K	2nd AF Cathode
R37	22KΩ	½		BTS-22K	Decoupling
R38	100Ω	½		BW-½-100	Voltage Divider (Wire Wound)
R39	100Ω	½		BW-½-100	Voltage Divider (Wire Wound)
R40	2200Ω	½		BTS-2200	Filter
R41	47KΩ	½		BTS-47K	Filter
R42	3300Ω	½		BTS-3300	Bleeder
R43	2200Ω	½			Surge Limiter
R44	1000Ω	½		BTS-1000	Output Load
R45	8200Ω	½		BTS-8200	Output Load

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .24A	255VAC .008ADC	6.3VAC @ 3.5A		T-375	P-6348 ‡	P-3048 † ‡	PH-70 † ‡

† Drill new mounting holes.
‡ Add series resistors to reduce plate voltage.

TRANSFORMER (IMP. MATCH.)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		D. BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	8.9KΩ	500Ω 200Ω 50Ω	645Ω	3.6Ω 3.4Ω 3Ω	T-273				

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					DAVID BOGEN PART No.		
M1	Bayonet	6-8	.15	Brown			Type #47
M2	Bayonet	6-8	.15	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	DAVID BOGEN PART No.	NOTES
M3	Fuse		AGC 1 Amp.
M4	Meter		DB Meter
M5	Rectifier		

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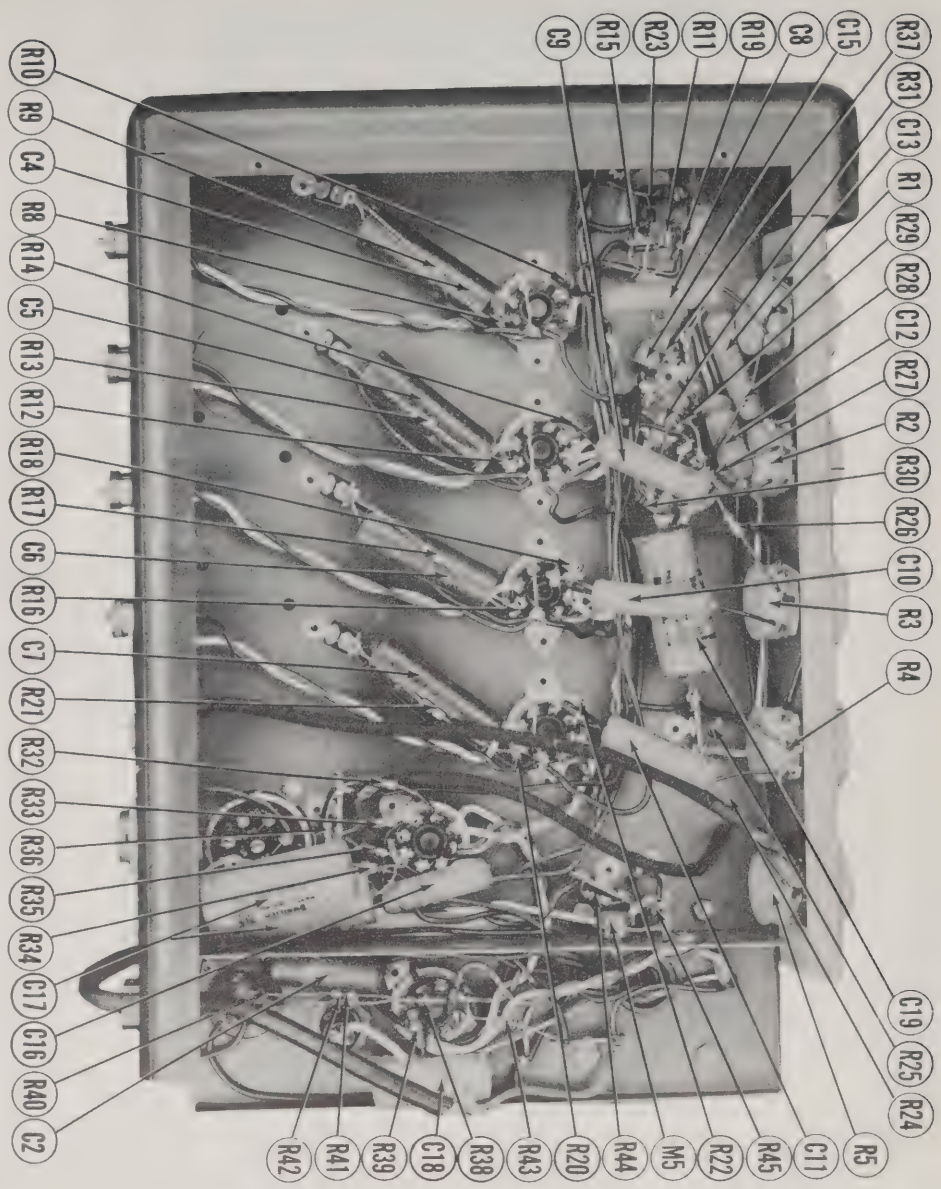
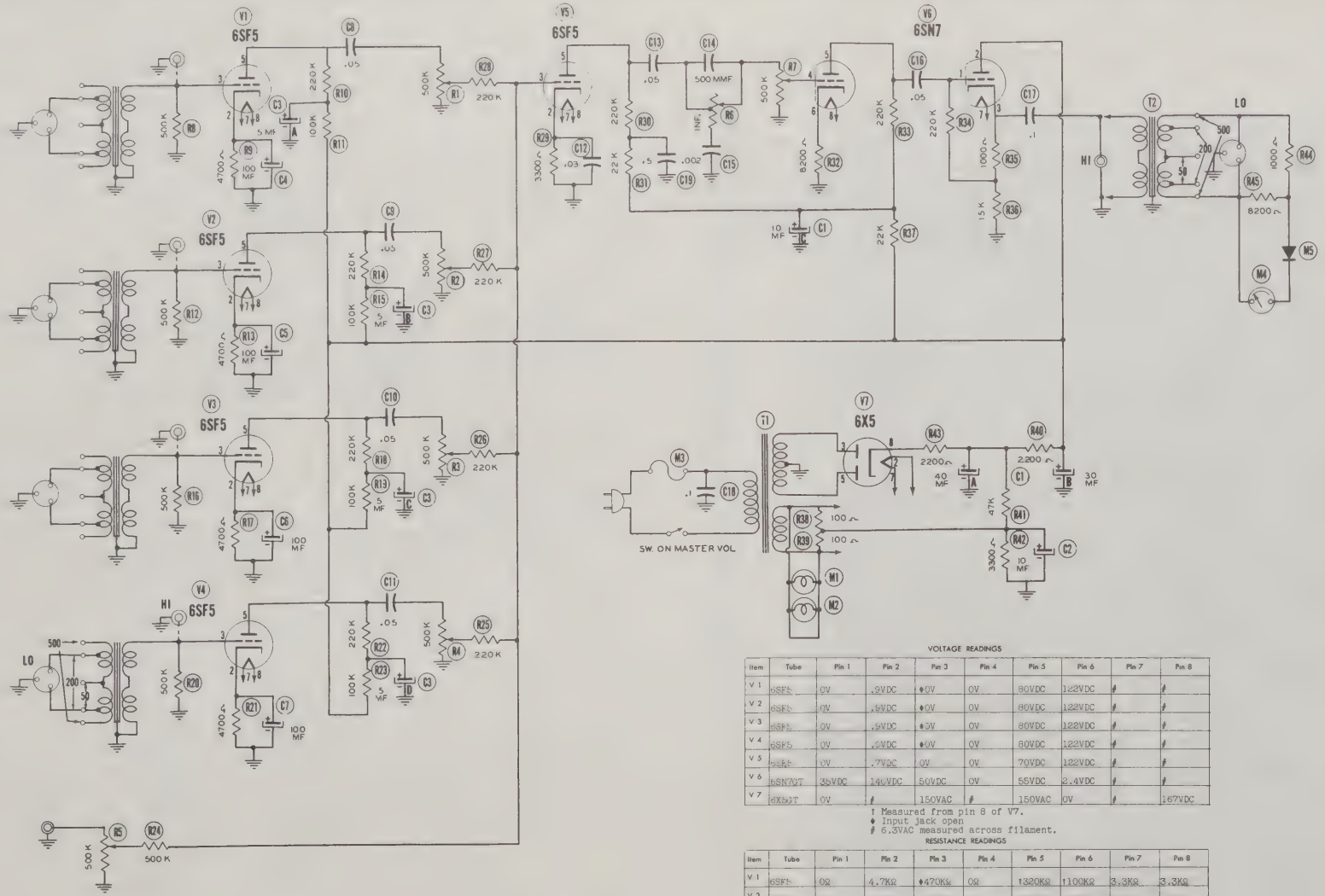
CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	0V	.9VDC	♦0V	0V	80VDC	122VDC	#	#
V 2	6SF5	0V	.9VDC	♦0V	0V	80VDC	122VDC	#	#
V 3	6SF5	0V	.9VDC	♦0V	0V	80VDC	122VDC	#	#
V 4	6SF5	0V	.9VDC	♦0V	0V	80VDC	122VDC	#	#
V 5	6SF5	0V	.7VDC	0V	0V	70VDC	122VDC	#	#
V 6	6SN7GT	35VDC	140VDC	50VDC	0V	55VDC	2.4VDC	#	#
V 7	6X5GT	0V	#	150VAC	#	150VAC	0V	#	167VDC

† Measured from pin 8 of V7.
♦ Input jack open
6.3VAC measured across filament.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	0Ω	4.7KΩ	♦470KΩ	0Ω	†320KΩ	†100KΩ	3.3KΩ	3.3KΩ
V 2	6SF5	0Ω	4.7KΩ	♦470KΩ	0Ω	†320KΩ	†100KΩ	3.3KΩ	3.3KΩ
V 3	6SF5	0Ω	4.7KΩ	♦470KΩ	0Ω	†320KΩ	†100KΩ	3.3KΩ	3.3KΩ
V 4	6SF5	0Ω	4.7KΩ	♦470KΩ	0Ω	†340KΩ	†100KΩ	3.3KΩ	3.3KΩ
V 5	6SF5	0Ω	3.3KΩ	70KΩ	0Ω	†260KΩ	†100KΩ	3.3KΩ	3.3KΩ
V 6	6SN7GT	†240KΩ	14.5KΩ	16KΩ	13Ω	†240KΩ	8.2KΩ	3.3KΩ	3.3KΩ
V 7	6X5GT	Inf.	3.3KΩ	135Ω	3.3KΩ	140Ω	Inf.	3.3KΩ	3.3KΩ

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, no signal applied for voltage measurements.

DAVID BOGEN
MODEL H15

DAVID BOGEN
MODEL H15

DAVID BOGEN MODEL H15

TRADE NAME	David Bogen, Model H15
MANUFACTURER	David Bogen Co., Inc., 663 Broadway, New York 12, New York
TYPE SET	AC Operated 3 Channel Audio Amplifier
TUBES(SEVEN)	Types 6SF5 Mic. #1 Pre Amp., 6SF5 Mic. #2 Pre Amp., 6SF5 1st AF Amp., 6SL7GT 2nd AF-Phase Inverter, (2) 6L6G Power Output, 5U4G or 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING: .93 Amp. @ 117 Volts AC

CONNECTIONS

INPUT: The microphone channels have input impedances of 2 megohms and are for use with high impedance microphones. The phonograph channel has a 0.5 megohm input impedance and is for use with a high impedance phonograph pickup.

OUTPUT: Voice coil impedances of 4, 8, and 16 ohms are provided as well as a standard 70 volt (325 ohm) constant voltage tap for speaker matching.

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DATE 12/49 SET #80 FOLDER 6

PARTS LIST AND DESCRIPTIONS

DAVID BOGEN
MODEL H15

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: DAVID BOGEN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Mic.#1 Pre Amp.	6SF5	6SF5	6AB	
V2	Mic.#2 Pre Amp.	6SF5	6SF5	6AB	
V3	1st AF Amp.	6SF5	6SF5	6AB	
V4	2nd AF Amp. Phase Inverter	6SL7GT	6SL7GT	8BD	
V5	Power Output	6L6G	6L6G	7AC	
V6	Power Output	6L6G	6L6G	7AC	
V7A	Rectifier	5U4G	5U4G	5T	
B	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: DAVID BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	10	450		AF2222J *	UP5Q45 †		EL-410*	● Filter
B	10	450						▲ Filter
C2A	5	450		AF2222J	UP5Q45		EL-410	● Decoupling
B	5	450						■ Decoupling
C	5	450						▲ Decoupling
D	5	450						Decoupling
C3	50	50		PRS50/50	BR505		TVA-16	Output Cath. Bypass
C4	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C5	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C6	.02	600		P688-02	GT6S2		TM-12	Audio Coupling
C7	.02	600		P688-02	GT6S2		TM-12	Audio Coupling
C8	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C9	.001	600		P688-001	GT6D1	GP2L-001	TM-21	Tone Comp.
C10	.006	600		P688-006	GT6D6		TM-26	Tone Comp.
C11	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	Tone Comp.
C12	.02	600		P688-02	GT6S2		TM-12	Tone Comp.
C13	.03	600		P688-03	GT6S3		TM-13	Tone Comp.
C14	.1	400		P488-1	GT4P1		TM-1	Audio Coupling
C15	.1	400		P488-1	GT4P1		TM-1	Audio Coupling
C16	.03	400		P488-03	GT4S3		TM-13	AF Feedback
C17	.006	600		P688-006	GT6D6		TM-26	Tone Comp.
C18	.1	500		P688-1	GT6P1		TM-1	Line Filter
C19	.006	600		P688-006	GT6D6	GP2-334-0068	TM-26	1st AF Cath. Bypass

* Use only two sections.
† Parallel sections to obtain desired capacity.

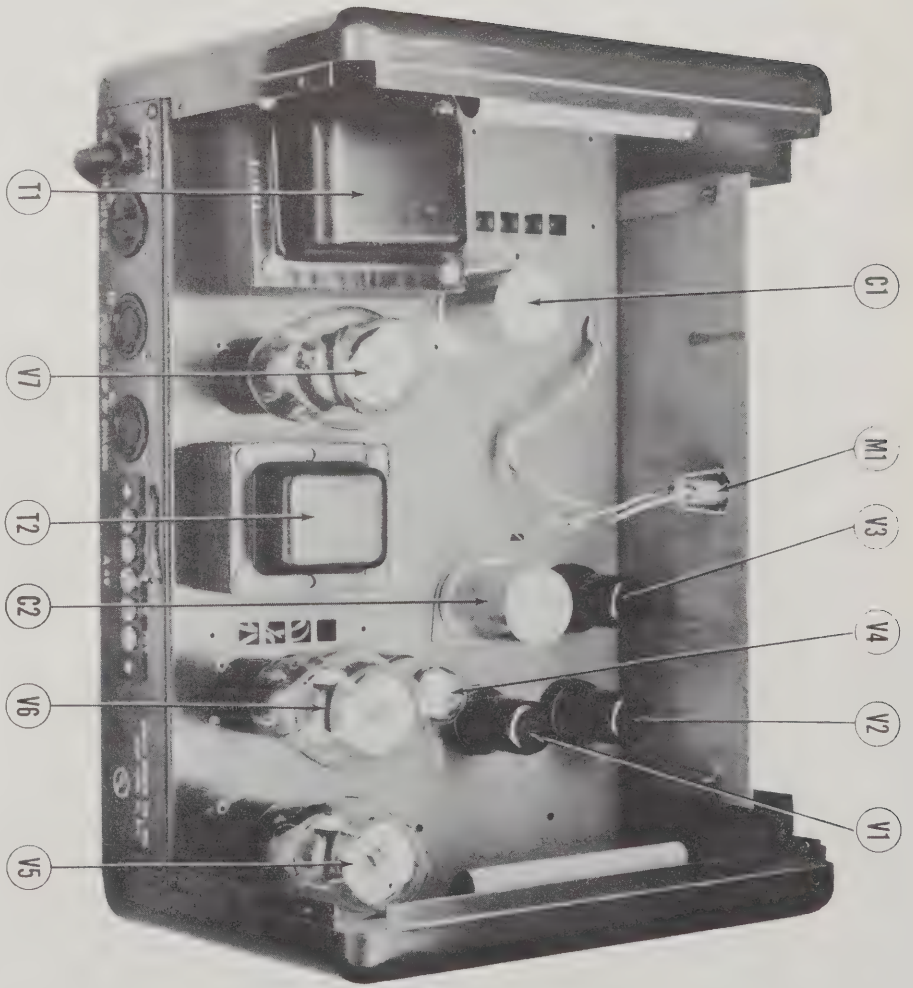
CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: D. BOGEN PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	500KΩ	½	V-202B	Q13-133	M-60-Z	Microphone #1 Volume Control
R2	500KΩ	½	V-202B	Q13-133	M-60-Z	Microphone #2 Volume Control
R3	500KΩ	½	V-202B	Q13-133	M-60-Z	Phono Volume Control

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: DAVID BOGEN PART No.	IRC PART No.	IDENTIFICATION CODES
R4	2.2 Meg.	½		BTS-2.2 Meg.	Microphone #1 Pre Amp. Grid
R5	270KΩ	½		BTS-270K	Microphone #1 Pre Amp. Plate
R6	2.2 Meg.	½		BTS-2.2 Meg.	Microphone #2 Pre Amp. Grid
R7	270KΩ	½		BTS-270K	Microphone #2 Pre Amp. Plate
R8	500KΩ	½		BTS-470K	Isolation
R9	270KΩ	½		BTS-270K	Isolation
R10	270KΩ	½		BTS-270K	Isolation
R11	3300Ω	½		BTS-3300	1st AF Cathode

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	DAVID BOGEN PART No.	IRC PART No.	
R12	330KΩ	½		BTS-330K	1st AF Plate
R13	100KΩ	½		BTS-100K	Decoupling
R14	47KΩ	½		BTS-47K	Decoupling
R15	47KΩ	½		BTS-47K	Tone Comp.
R16	47KΩ	½		BTS-47K	Tone Comp.
R17	22KΩ	½		BTS-22K	Tone Comp.
R18	10KΩ	½		BTS-10K	Tone Comp.
R19	22KΩ	½		BTS-22K	Tone Comp.
R20	270KΩ	½		BTS-270K	Feedback
R21	15KΩ	½		BTS-15K	Feedback
R22	500KΩ	½		BTS-470K	2nd AF Grid
R23	2200Ω	½		BTS-2200	2nd AF Cathode
R24	270KΩ	½		BTS-270K	2nd AF Plate
R25	6800Ω	½		BTS-6800	Phase Inv. Grid
R26	2200Ω	½		BTS-2200	Phase Inv. Cathode
R27	270KΩ	½		BTS-270K	Phase Inv. Plate
R28	100KΩ	½		BTS-100K	Output Grid
R29	100KΩ	½		BTS-100K	Output Grid
R30	33Ω	½		BW-½-33	Output Cathode (Wire Wound)
R31	200Ω	8		AB-200	Output Cathode (Wire Wound)
R32	1000Ω	2		BW-2-1000	Tone Compensation (Wire Wound)
R33	10KΩ	½		BTS-10K	Decoupling
R34	2400Ω	1		BW-1-2700	Filter
R35	40KΩ	8			Bleeder (Wire Wound)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .97A	810VCT .108ADC	5VAC @ 2A	6.3VAC @ 3.2A	T-367-1	P-6165 #	P-2955 #	

Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	5.8KΩ CT	32Ω 16Ω 8Ω 4Ω	184Ω CT	17Ω 1Ω .7Ω .5Ω	T-271	A-3307 #	A-3130 #	PSO-80 #	# Drill new mounting holes.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	D. BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.108A	60Ω	1.6Henries	T-502	C-2304 ‡	C-2974 ‡	R-885 ‡	‡ Drill one new mounting hole.

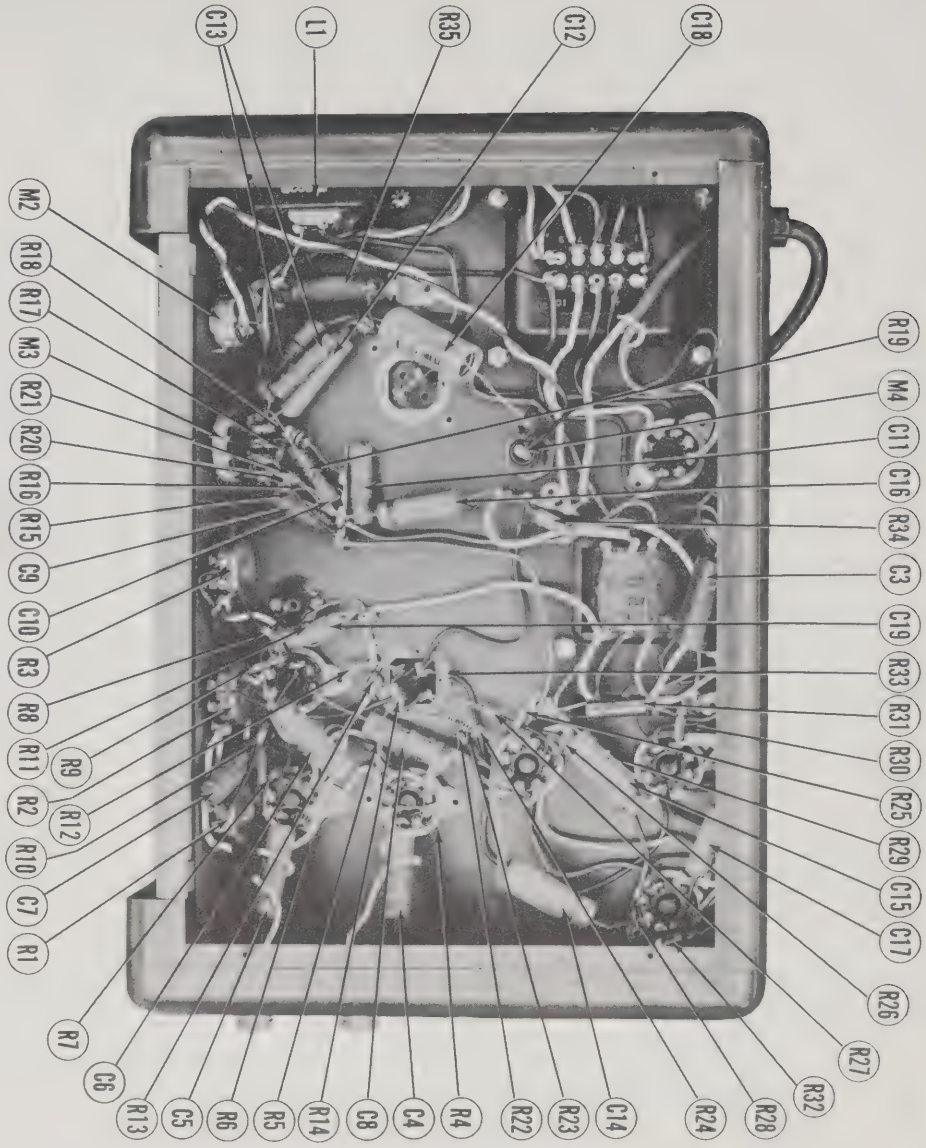
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					DAVID BOGEN PART No.		
M1	Bayonet	6-8	.15	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	DAVID BOGEN PART No.	NOTES
M2	Switch		On-Off
M3	Switch		Tone
M4	Fuse		AGC 1.5 Amp.

CHASSIS—BOTTOM VIEW



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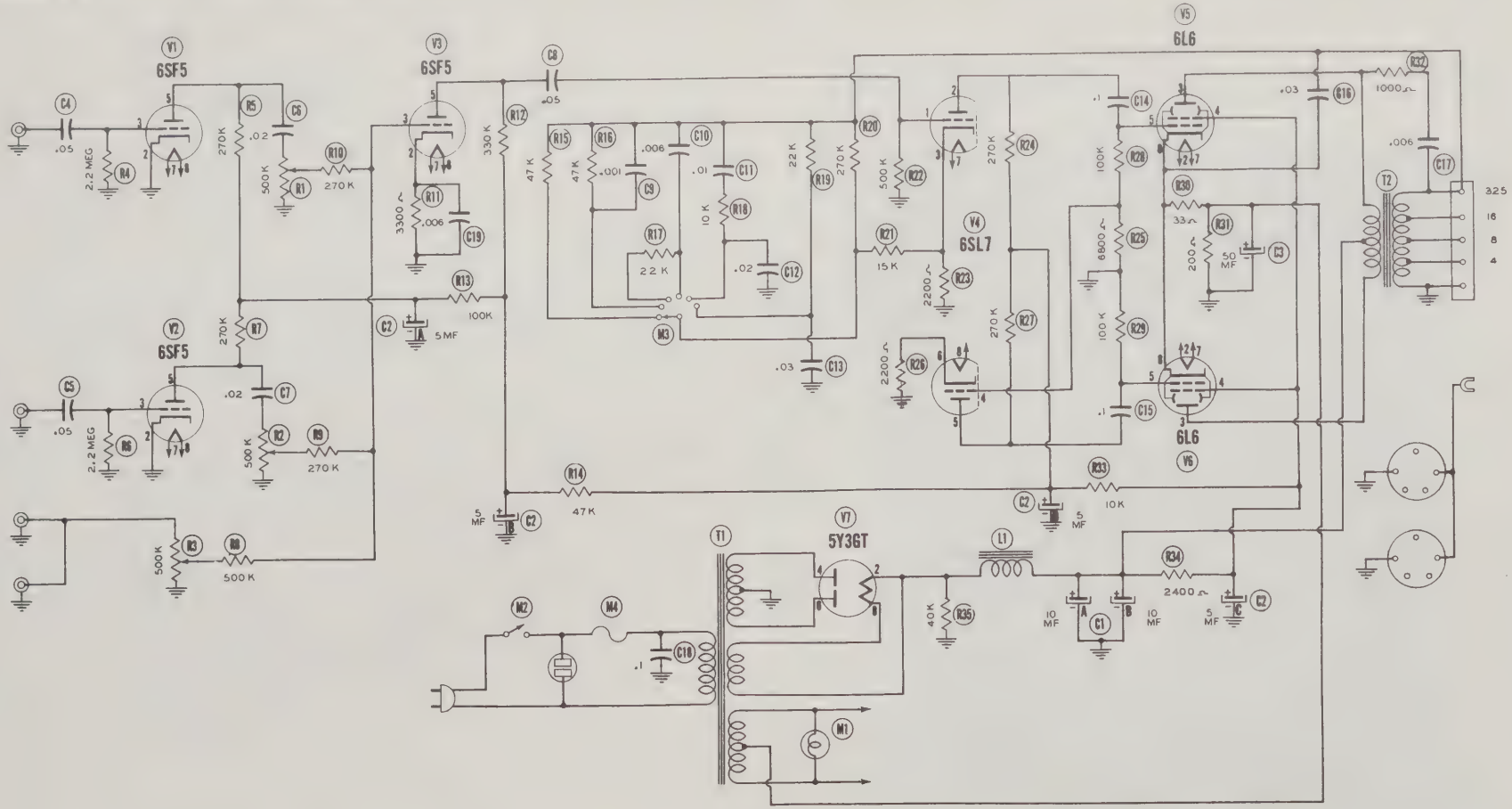
DAVID BOGEN MODEL H15

DAVID BOGEN MODEL H15



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	0V	0V	-.8VDC	0V	85VDC	0V	#	#
V 2	6SF5	0V	0V	-.7VDC	0V	85VDC	170VAC	#	#
V 3	6SF5	0V	1.2VDC	0V	0V	125VDC	0V	#	#
V 4	6SL7GT	0V	100VDC	1.3VDC	0V	117VDC	1.4VDC	#	#
V 5	6L6G	0V	#	320VDC	310VDC	.1VDC	0V	#	
V 6	6L6G	0V	#	320VDC	310VDC	.1VDC	0V	#	
V 7	5U4G	0V	330VAC	0V	410VAC	0V	410VAC	0V	330VDC

† Measured from pin 8 of V7
# 6.3VAC measured across filaments

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	0Ω	0Ω	2.2Meg.	0Ω	†440KΩ	0Ω	200Ω	200Ω
V 2	6SF5	0Ω	0Ω	2.2Meg.	0Ω	†440KΩ	†160KΩ	200Ω	200Ω
V 3	6SF5	0Ω	3.3KΩ	110KΩ	Inf.	†390KΩ	Inf.	200Ω	200Ω
V 4	6SL7GT	470KΩ	†280KΩ	2.2KΩ	6.8KΩ	†280KΩ	2.2KΩ	200Ω	200Ω
V 5	6L6G	Inf.	200Ω	†170Ω	12.5KΩ	100KΩ	6.8KΩ	200Ω	230Ω
V 6	6L6G	Inf.	200Ω	†165Ω	12.5KΩ	100KΩ	Inf.	200Ω	230Ω
V 7	5U4G	Inf.	50KΩ	Inf.	95Ω	Inf.	87Ω	Inf.	50KΩ

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

PHOTOFACT* Folder

*TRADE MARK

HALLICRAFTERS MODELS
512C, 513, 515, 520E, 521E, 524

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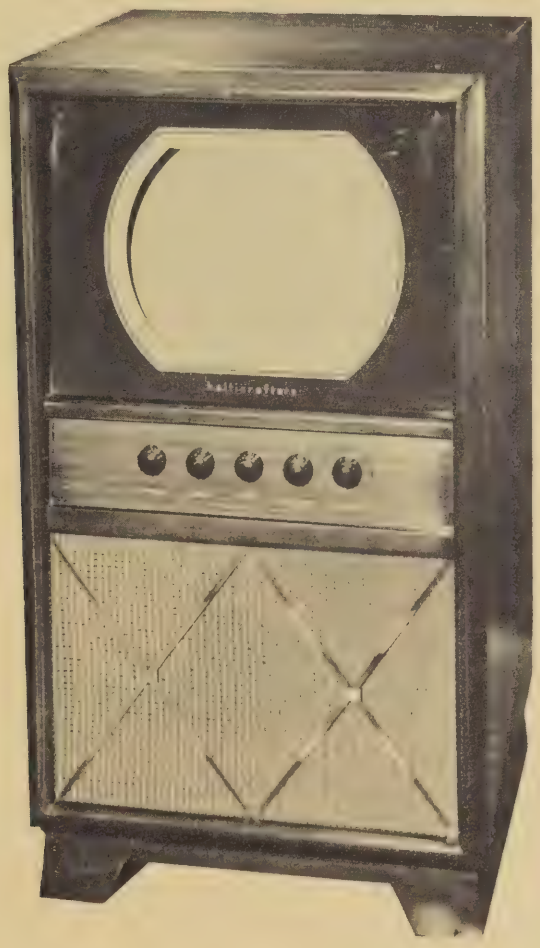

MODEL 512C

HALLICRAFTERS MODELS
512C, 513, 515, 520E, 521E, 524

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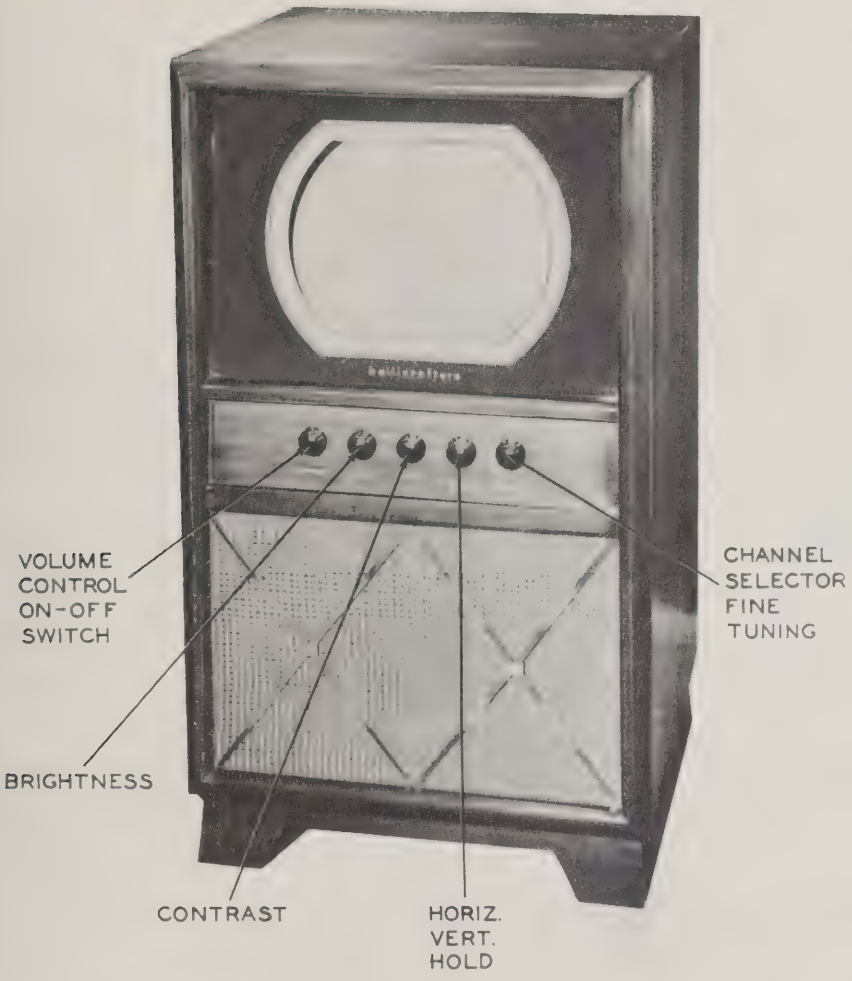

HALLICRAFTERS MODELS
512C, 513, 515, 520E, 521E, 524

HALLICRAFTERS MODEL 512C

TRADE NAME	Hallicrafters, Models 512C, 513, 515, 520E, 521E, 524
MANUFACTURER	The Hallicrafters Co., 4401 W. 5th Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Twenty Three

POWER SUPPLY 110-120 Volts AC-60 Cycle RATING 2.0 Amp. @ 117 Volts AC
TUNING RANGE—Channels 2 thru 13

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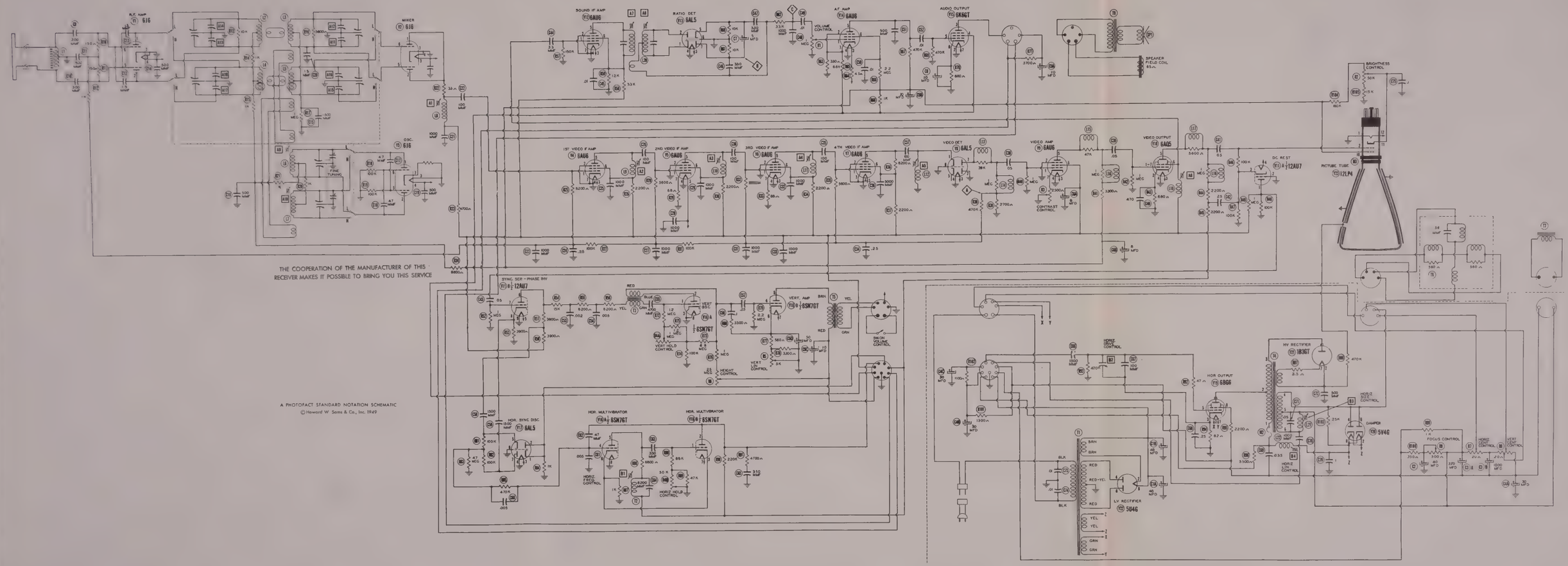
DATE 12/49 SET #80 FOLDER #7


R.F. AMP
MIXER
OSC.
SOUND IF AMP
RATIO DET
AF AMP
AUDIO OUTPUT
VOLUME CONTROL
SPEAKER FIELD COIL 85 Ω
1ST VIDEO IF AMP
2ND VIDEO IF AMP
3RD VIDEO IF AMP
4TH VIDEO IF AMP
VIDEO DET
VIDEO AMP
VIDEO OUTPUT
CONTRAST CONTROL
DC REST
BRIGHTNESS CONTROL
PICTURE TUBE
SYNC. SEP.-PHASE INV.
VERT. OSC.
VERT. AMP.
VERT. HOLD CONTROL
HEIGHT CONTROL
VERT. LIN. CONTROL
SW. ON VOLUME CONTROL
HOR. SYNC DISC.
HOR. MULTIVIBRATOR
HORIZ. FREQ. CONTROL
HORIZ. HOLD CONTROL
HOR. OUTPUT
HV RECTIFIER
HORIZ. DRIVE CONTROL
HORIZ. SIZE CONTROL
HORIZ. LIN. CONTROL
DAMPER
FOCUS CONTROL
HORIZ. CENTER CONTROL
VERT. CENTER CONTROL
LV RECTIFIER
FINE TUNING
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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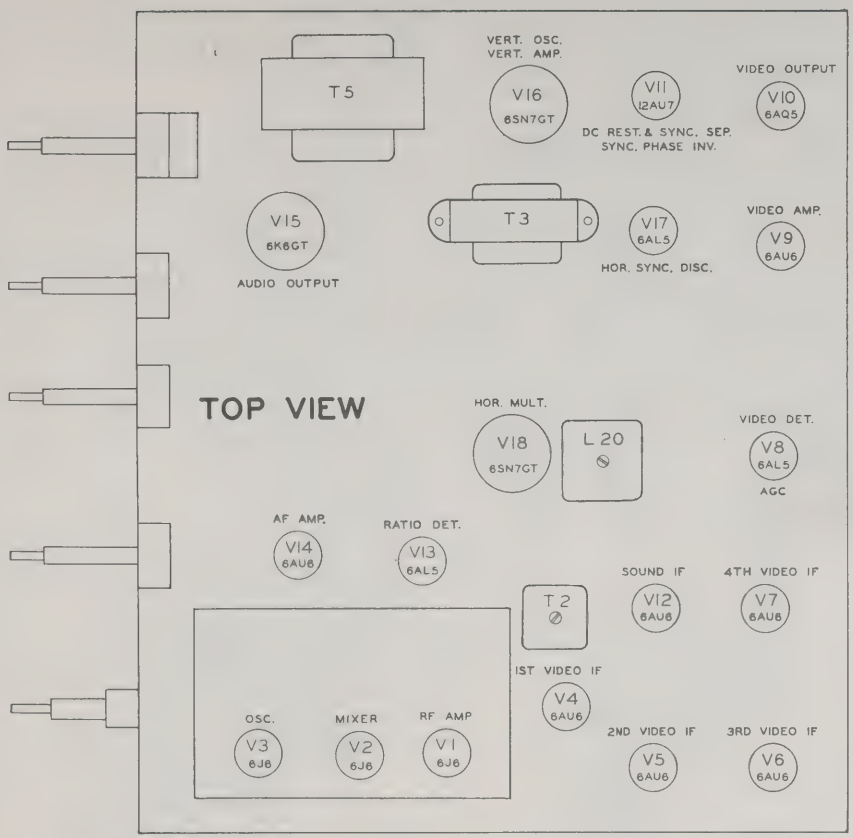
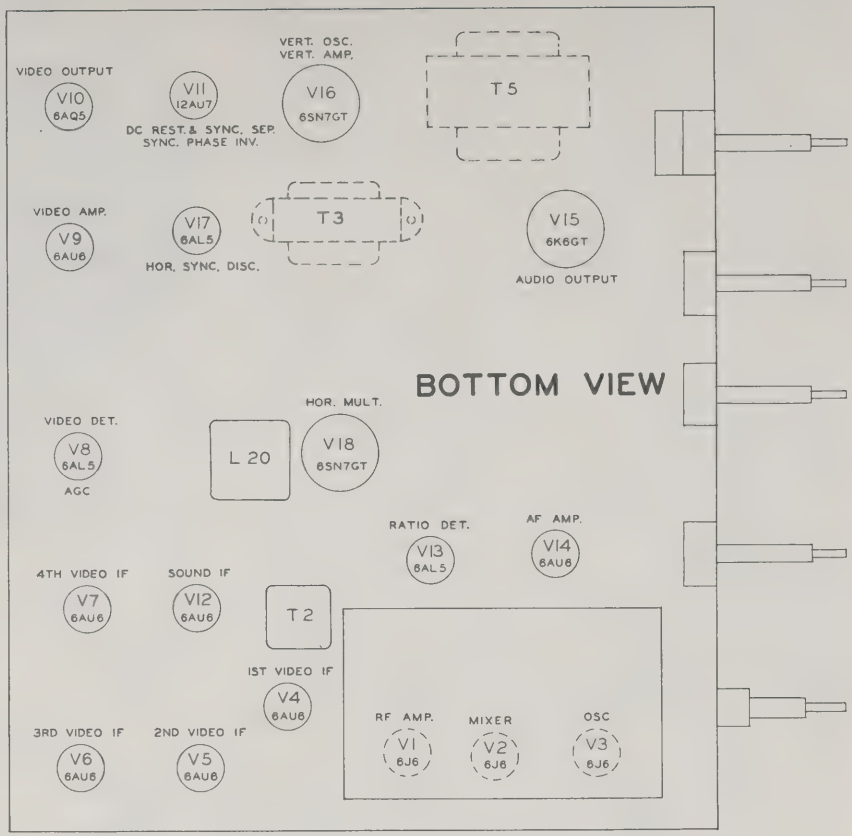
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

HALLICRAFTERS MODELS
512, 513, 515, 520E, 521E, 524

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If the receiver is to be aligned with the picture tube removed, the high voltage lead should be taped and placed away from the chassis.

All of the plugs between the power supply and main chassis must be connected for proper operation of the receiver. The speaker must be plugged in to supply B+ voltage for the receiver.

VIDEO IF ALIGNMENT

Remove the local oscillator tube V3 to prevent erroneous indications.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	22.8MC (Unmod.)	Any	DC Probe to Point (A) Common to chassis.	A1	Adjust for maximum deflection. Attenuate signal generator to maintain 2 volt reading on VTVM.
2.	"	"	25.8MC	"	"	A2	"
3.	"	"	23.8MC	"	"	A3	"
4.	"	"	25.2MC	"	"	A4	"
5.	"	"	26.3MC	"	"	A5	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to ungrounded tube shield floating over mixer tube, (V2). Low side to chassis.	24MC (10MC Sweep)	21.75MC 26.25MC	Any	Vert. Amp. to Point (A) Low side to chassis.		Check for response similar to Fig 1 with markers as shown. If necessary retouch A1 thru A5 for optimum response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (Grid) of 6AQ5 (V10). Low side to chassis.	4.5MC (Unmod.)	Any channel not used locally.	DC Probe to Point (B) Common to chassis.	A6,A7	Adjust A6 for maximum deflection and then A7 for maximum deflection. A6 will be found to tune very broad. After alignment is completed, tune in a test pattern and adjust A6 for maximum vertical wedge definition.
8.	.01MFD	"	"	"	DC Probe to Point (C) Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (Grid) of 6AQ5 (V10). Low side to chassis.	4.5MC (450KC Sweep)	4.5MC	Any channel not used locally	Vert. Amp. to Point (B) Low side to chassis.	A6,A7	Disconnect stabilizer capacitor C7. Adjust first A6 and then A7 for maximum amplitude and symmetry as per Fig 2. A6 will be found to tune very broad. After alignment is completed, tune in a test pattern and adjust A6 for maximum vertical wedge definition.
8.	.01MFD	"	"	"	"	Vert. Amp. to Point (C) Low side to chassis.	A8,A7	Reconnect capacitor C7. Adjust A8 so 4.5MC occurs at center of crossover lines as per Fig 3. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

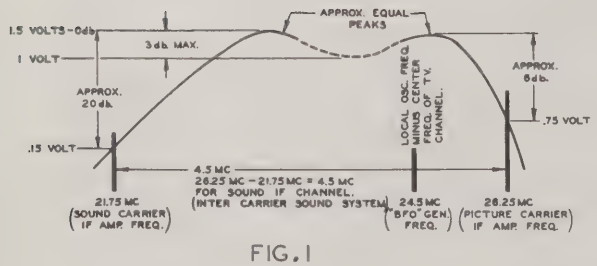

1.5 VOLTS-0db
1 VOLT
APPROX. EQUAL PEAKS
3db. MAX.
APPROX. 20db.
.15 VOLT
APPROX. 6db.
.75 VOLT
LOCAL OSC. FREQ. MINUS CENTER FREQ. OF TV CHANNEL.
4.5 MC
26.25 MC - 21.75 MC = 4.5 MC FOR SOUND IF CHANNEL. (INTER CARRIER SOUND SYSTEM)
21.75 MC (SOUND CARRIER IF AMP. FREQ.)
24.5 MC (BFO GEN. FREQ.)
26.25 MC (PICTURE CARRIER IF AMP. FREQ.)

FIG. 1

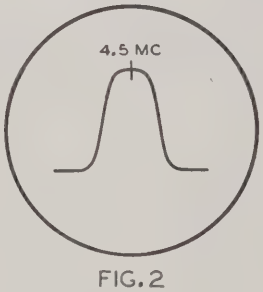


FIG. 2

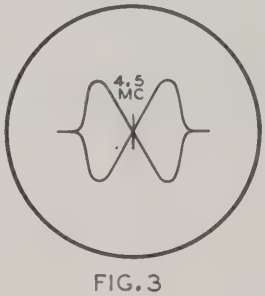


FIG. 3

ALIGNMENT INSTRUCTIONS (CONT.)

RF AND OSCILLATOR ALIGNMENT

The RF and mixer circuits are pre-aligned at the factory and are noramlly very stable. Steps 11 and 12 should not be performed, unless it is definitely known that the RF and mixer circuits are out of alignment.

Replace the local oscillator tube V3.

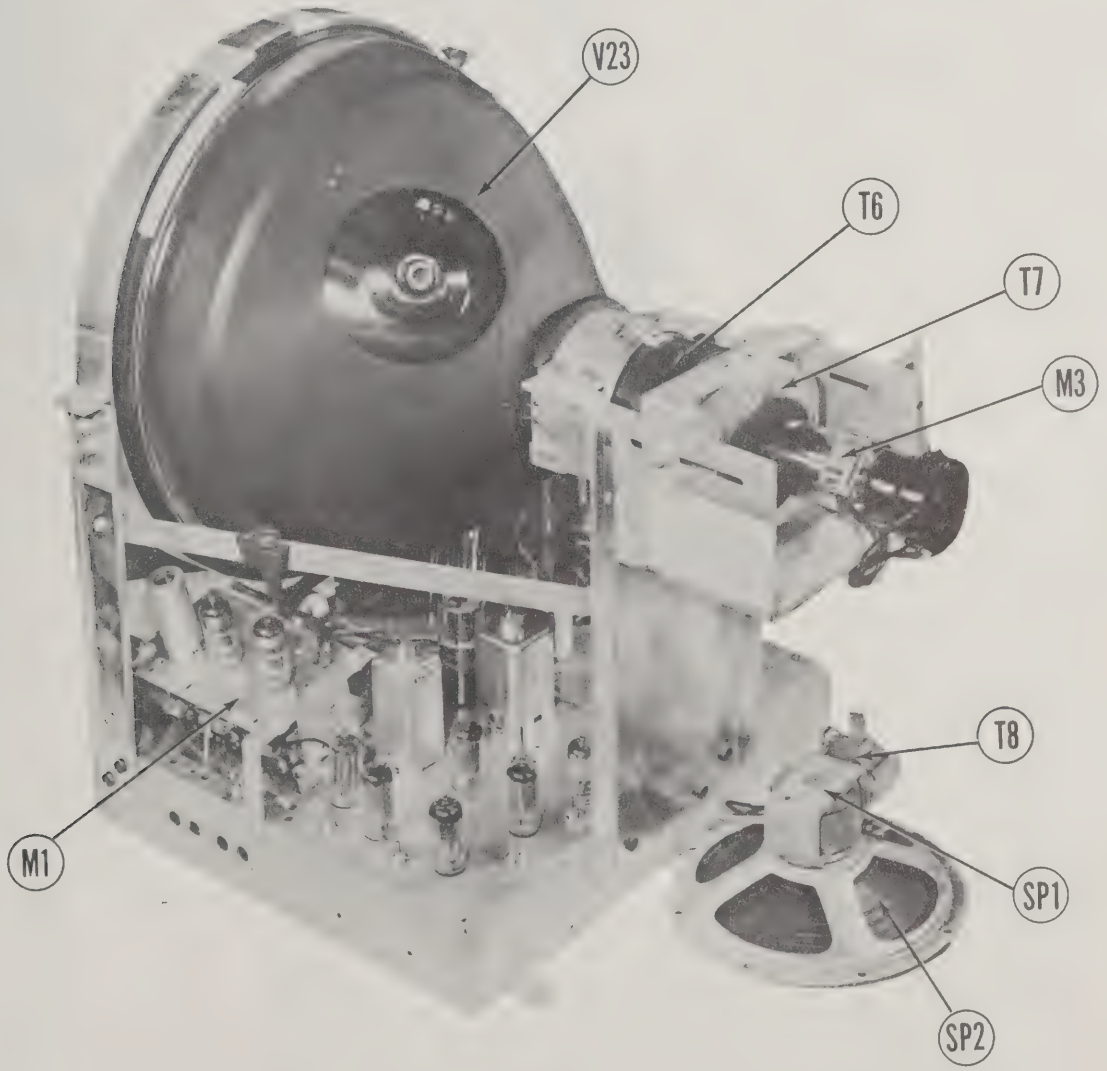
The local oscillator operates 24.5MC above the center frequency of each TV channel. To set the local oscillator, a separate "BFO" generator set at 24.5MC is used to obtain a zero beat with this difference frequency. Couple the "BFO" generator to the receiver by connecting the output lead to a coil of hook up wire wrapped around the video detector tube V8.

Set the fine tuning control to the mid position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	BFO GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	Two 150Ω carbon res.	Across antenna terminals with 150Ω in each lead.	57MC (Unmod.)	24.5MC (Unmod.)	2		A9	Connect a .01MFD capacitor between pin 2 of picture tube (V23) and pin 1 of 6AU6 (V14). Adjust A9 for a rough audio beat using the speaker as an indicator.
10.	"	"	177MC	"	7		A10	"

Check all channels to see that they are received well within the range of the fine tuning control.

11.	"	"	85MC	"	6	DC Probe to Point A. Common to chassis.	A11,A12 A13,A14	Adjust for maximum deflection. Keep RF and mixer trimmer pairs at approximately the same relative position. Attenuate the signal generator to maintain a 1 volt reading on the VTVM.
12.	"	"	213MC	Off	13	"	A15,A16 A17,A18	"



CHASSIS–TOP VIEW

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	87VDC	87VDC	0V	6.3VAC	-1VDC	-1VDC	0V		
V 2	6J6	125VDC	125VDC	6.3VAC	0V	-1.8VDC	-1.9VDC	0V		
V 3	6J6	70VDC	70VDC	0V	6.3VAC	§-3.5VDC	§-3VDC	0V		
V 4	6AU6	-2VDC	0V	6.3VAC	0V	145VDC	145VDC	0V		
V 5	6AU6	-.5VDC	0V	6.3VAC	0V	150VDC	150VDC	.6VDC		
V 6	6AU6	-.6VDC	0V	6.3VAC	0V	145VDC	145VDC	.5VDC		
V 7	6AU6	-.6VDC	0V	6.3VAC	0V	130VDC	140VDC	0V		
V 8	6AL5	0V	0V	6.3VAC	0V	0V	0V	-3.1VDC		
V 9	6AU6	0V	0V	6.3VAC	0V	200VDC	162VDC	3.9VDC		
V 10	6AQ5	0V	10VDC	6.3VAC	0V	280VDC	160VDC	0V		
V 11	12AU7	15VDC	0V	1.5VDC	6.3VAC	6.3VAC	150VDC	0V	7VDC	0V
V 12	6AU6	-.5VDC	0V	6.3VAC	0V	30VDC	30VDC	0V		
V 13	6AL5	.1VDC	.1VDC	6.3VAC	0V	.2VDC	0V	-.2VDC		
V 14	6AU6	0V	0V	5VAC	0V	115VDC	45VDC	1.2VDC		
V 15	6K6GT	0V	0V	315VDC	230VDC	0V	40VDC	6.3VAC	17VDC	
V 16	6SN7GT	-4.5VDC	62VDC 145VDC	0V	0V	400VDC	10VDC 15VDC	6.3VAC	0V	
V 17	6AL5	0V	0V	6.3VAC	0V	6.9VDC	0V	-12VDC		
V 18	6SN7GT	0V	115VDC	8VDC	-.6VDC	290VDC	8VDC	6.3VAC	0V	
V 19	6BG6G	0V	0V	8.9VDC	0V	-12VDC	0V	6.3VAC	320VDC	TOP CAP *
V 20	5V4G	0V	440VDC	0V	350VDC	0V	350VDC	0V	440VDC	
V 21	1B3GT	* DO NOT MEASURE								
V 22	5U4G	0V	400VDC	380VDC	390VDC	0V	390VDC	350VDC	400VDC	
V 23	12LP4	0V	1VDC	PIN 10 200VDC	PIN 11 55VDC	PIN 12 6.3VAC				

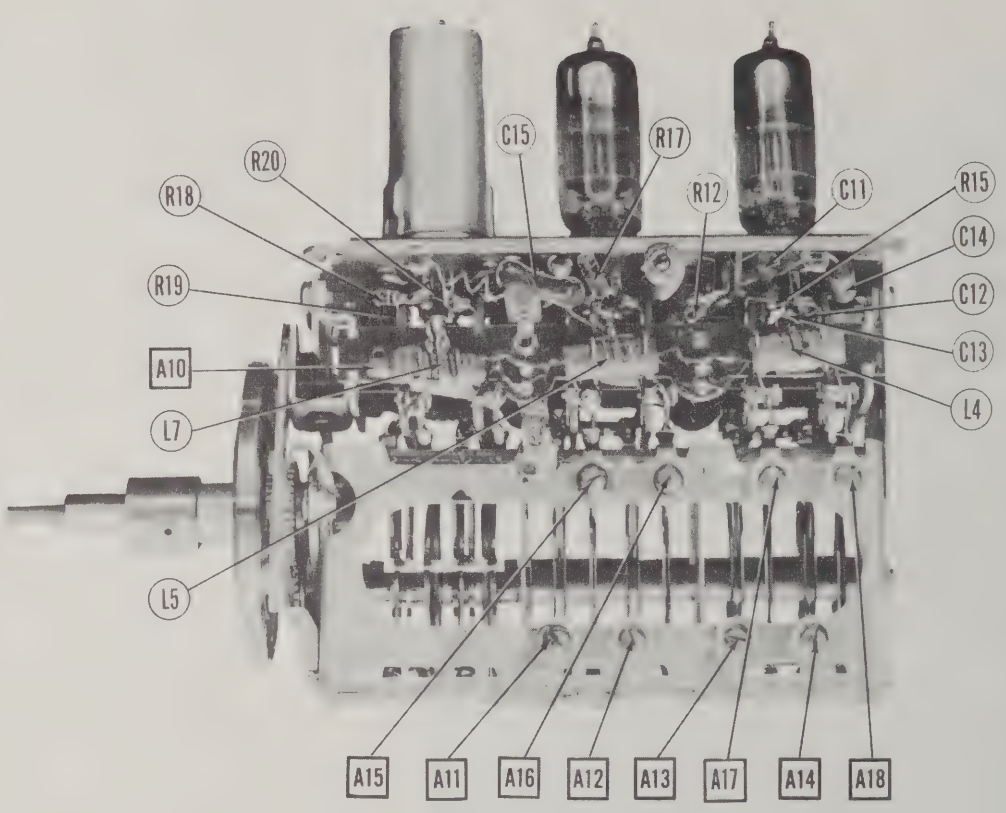
§ Taken with vacuum tube voltmeter.
Note: All measurements made on channel 4.

RESISTANCE READINGS

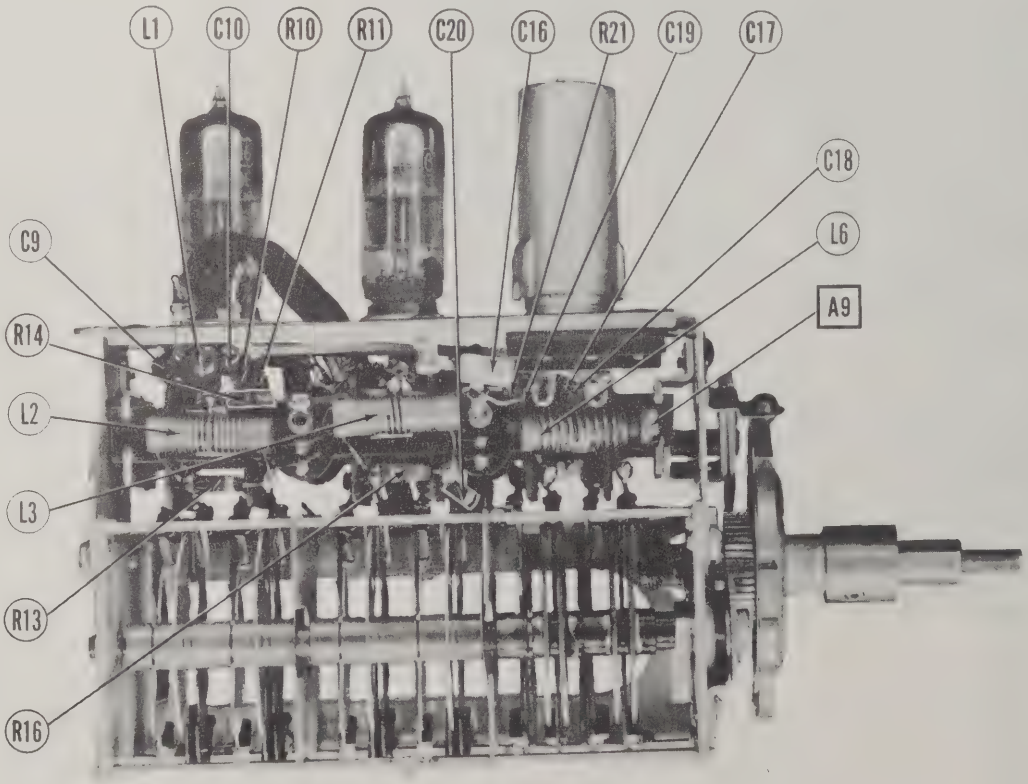
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	†11KΩ	†11KΩ	0Ω	.1Ω	680KΩ	680KΩ	0Ω		
V 2	6J6	†7.5KΩ	†7.5KΩ	.1Ω	0Ω	1 Meg.	1 Meg.	0Ω		
V 3	6J6	†10KΩ	†10KΩ	0Ω	.1Ω	100KΩ	100KΩ	0Ω		
V 4	6AU6	680KΩ	0Ω	.1Ω	0Ω	†5KΩ	†5KΩ	0Ω		
V 5	6AU6	580KΩ	0Ω	.1Ω	0Ω	†5KΩ	†5KΩ	68Ω		
V 6	6AU6	480KΩ	0Ω	.1Ω	0Ω	†5KΩ	†5KΩ	68Ω		
V 7	6AU6	480KΩ	0Ω	.1Ω	0Ω	†13KΩ	†5KΩ	0Ω		
V 8	6AL5	.1Ω	0Ω	.1Ω	0Ω	Inf.	0Ω	2.7KΩ		
V 9	6AU6	1 Meg.	0Ω	.1Ω	0Ω	†6KΩ	†2.5KΩ	2.5KΩ		
V 10	6AQ5	1 Meg.	680Ω	.1Ω	0Ω	†4.5KΩ	†2.5KΩ	1 Meg.		
V 11	12AU7	†120KΩ	0Ω	100KΩ	.1Ω	.1Ω	†10KΩ	1 Meg.	4KΩ	0Ω
V 12	6AU6	160KΩ	0Ω	.1Ω	0Ω	†25KΩ	†25KΩ	0Ω		
V 13	6AL5	Inf.	Inf.	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 14	6AU6	20Ω	330Ω	2.2Ω	0Ω	†470KΩ	†2.2Meg.	330Ω		
V 15	6K6GT	0Ω	0Ω	†3.7KΩ	†1.5KΩ	470KΩ	†7.5KΩ	.1Ω	680Ω	
V 16	6SN7GT	1.5Meg.	†2.5Meg. †1 Meg.	0Ω	2.2Meg.	†27KΩ	2KΩ 600Ω	.1Ω	0Ω	
V 17	6AL5	1000Ω	1000Ω	.1Ω	0Ω	4.8Meg.	0Ω	4.8Meg.		
V 18	6SN7GT	100KΩ	†270KΩ	1000Ω	5 Meg.	†7KΩ	1000Ω	.1Ω	0Ω	
V 19	6BG6G	Inf.	0Ω	82Ω	Inf.	470KΩ	Inf.	.1Ω	†2.5KΩ	TOP CAP †27KΩ
V 20	5V4G	Inf.	†25KΩ	Inf.	†2KΩ	Inf.	†2KΩ	Inf.	†25KΩ	
V 21	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP †25KΩ
V 22	5U4G	Inf.	20KΩ	20KΩ	19Ω	Inf.	17Ω	20KΩ	20KΩ	
V 23	12LP4	0Ω	200KΩ	PIN 10 22KΩ	PIN 11 50KΩ	PIN 12 .1Ω				

† Measured from pin 2 of V22

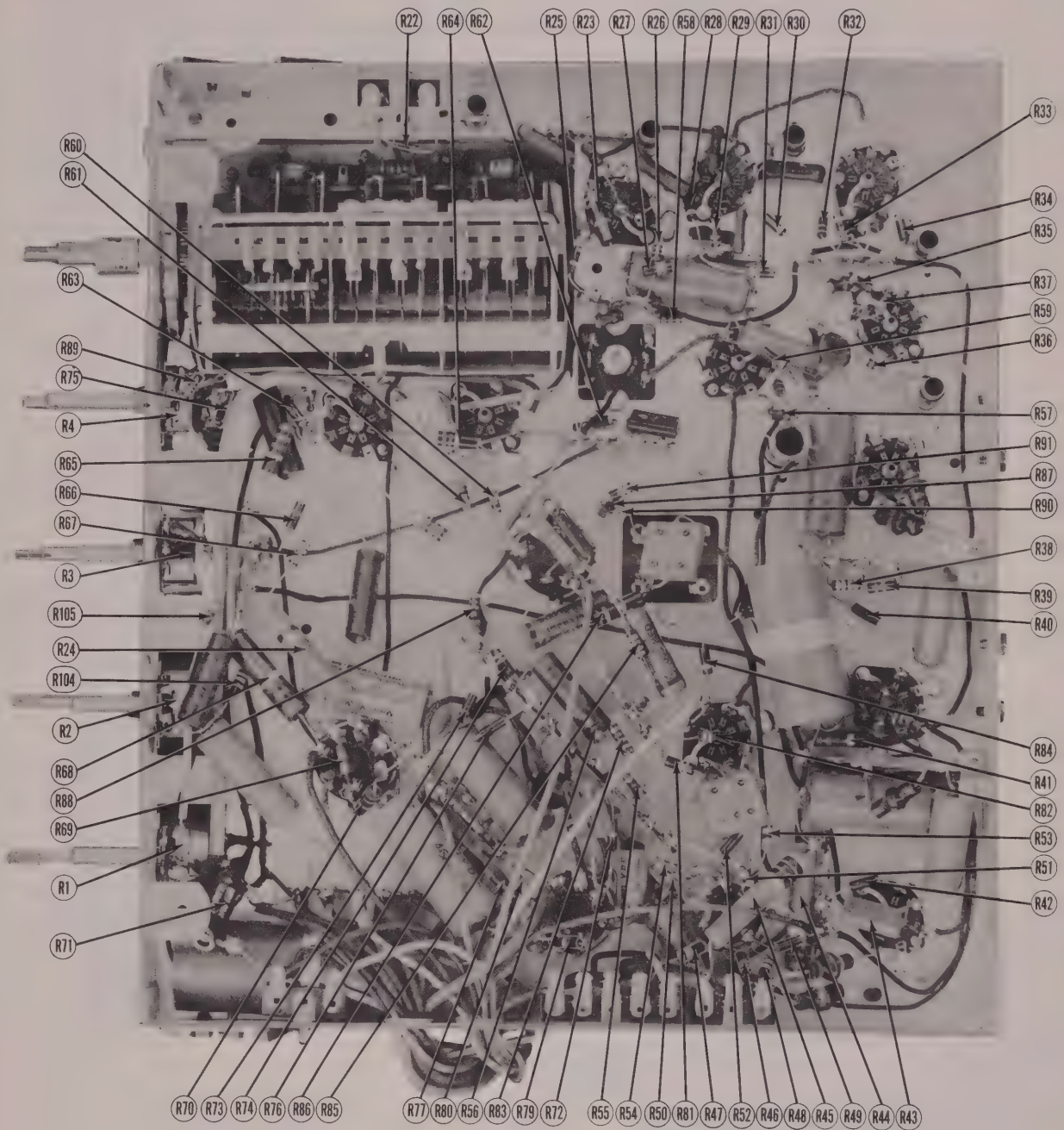
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



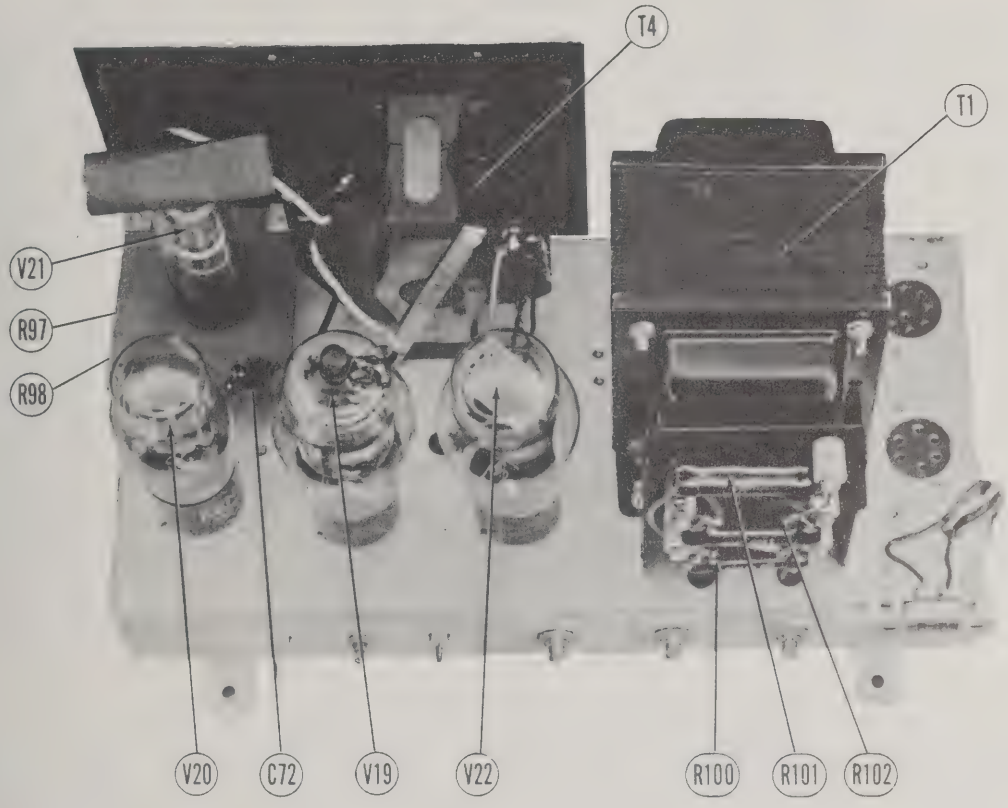
RF TUNER-RIGHT SIDE



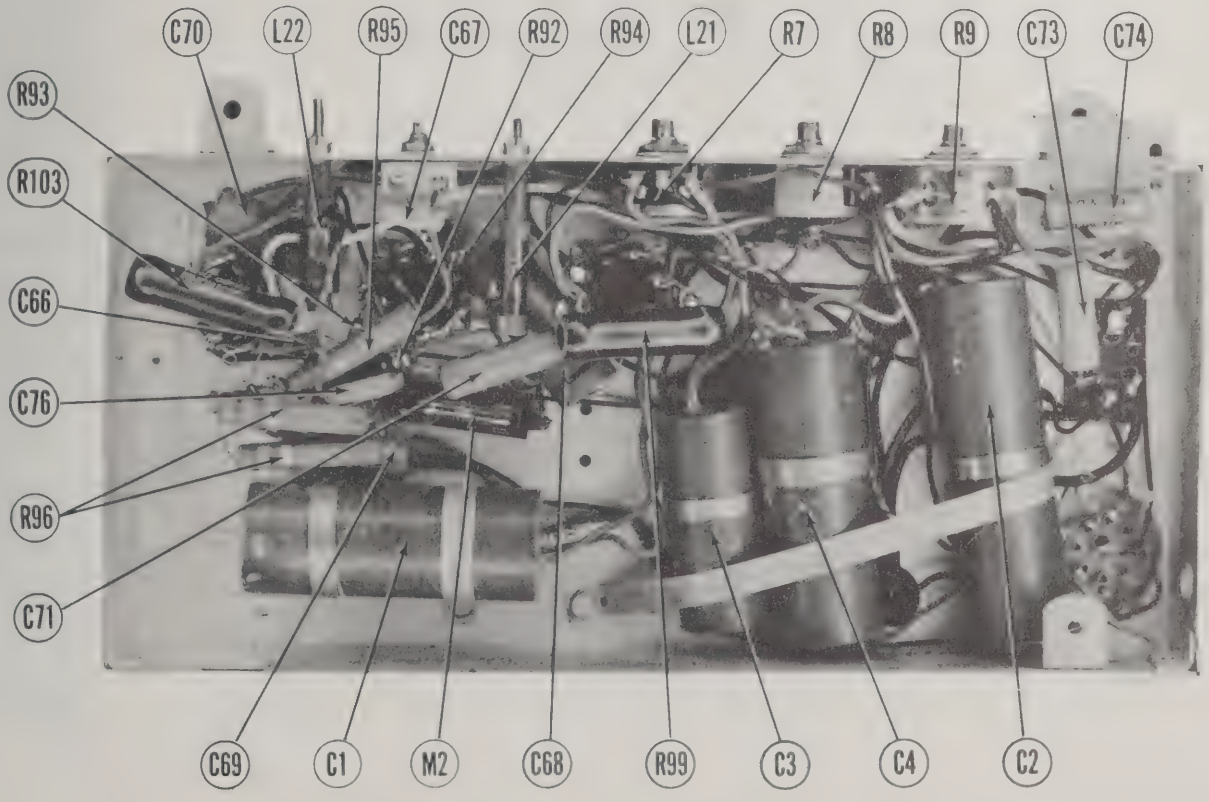
RF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW- RESISTOR IDENTIFICATION



HIGH VOLTAGE SUPPLY-TOP VIEW



HIGH VOLTAGE SUPPLY-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HALLICRAFTERS PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.		6J6	7BF	
V2	Mixer		6J6	7BF	
V3	Osc.		6J6	7BF	
V4	1st Video IF		6AU6	7BK	
V5	2nd Video IF		6AU6	7BK	
V6	3rd Video IF		6AU6	7BK	
V7	4th Video IF		6AU6	7BK	
V8	Video Det. & AGC		6AL5	6BT	
V9	Video Amp.		6AU6	7BK	
V10A	Video Output		6AQ5	7BZ	
B	Video Output		6V6GT	7AC	
V11A	DC Restorer-Sync. Sep.-		12AU7	9A	
	Sync. Phase Inv.		12AU7	9A	
B	DC Restorer-Sync. Sep.-		6SN7GT	6BD	
	Sync. Phase Inv.		6SN7GT	6BD	
V12	Sound IF Amp.		6AU6	7BK	
V13	Ratio Det.		6AL5	6BT	
V14	AF Amp.		6AU6	7BK	
V15	Audio Output		6K6GT	7S	
V16	Vert. Osc.		6SN7GT	6BD	
	Vert. Amp.		6SN7GT	6BD	
V17	Horr. Sync. Disc.		6AL5	6BT	
V18	Hor. Mult.		6SN7GT	6BD	
V19	Hor. Output		6BG6G	5BT	
V20	Damper		5V4G	5L	
V21	HV Rectifier		1B3GT	3C	
V22	LV Rectifier		5U4G	5T	
V23A	Picture Tube		12LP4	12D	Used in models 512C, 521E
B	Picture Tube		15DP4	12D	Used in models 515, 520E
C	Picture Tube		16AP4	12D	Alternate tube used in 520E
D	Picture Tube		10BP4	12D	Used in models 513, 524

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HALLICRAFTER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	45B137	PRSA450/40-	EDJ10118		TVL-64#	Filter Red
B	40	450		40				Filter Red
C2	80	450	45B136	PRSA450/40-40 *	EZ10074		TVL-9#	Filter
C3A	250	10	45B134	†PRS12/250	EZ10095		TVL-66#	Hor. Cent. Cont. Bypass Red
B	1000	6		†PRS6/1000				Vert. Cent.Cont. Bypass Yel.
C4A	30	450	45B154	†PRSA450/30-35				Filter Red
B	30	350		†PRS250/40				Filter Yellow
C	30	250						Filter Blue
C5A	10	450	45B135	†AF222J #	EZ10090		D13422	Output Plate Decoup. Red
B	10	450		†PRS80/100				Decoupling Blue
C	10	450						Decoupling Red
D	150	50						Vert. Output Cath. Byp. Yel.
C6A	8	300	34B139	PRS450/8-8	BRD1145		TVA-25	Filter
B	8	300						Decoupling
C7	5	50	45A109	PRS150/4	BR550		TVA-13	Stabilizing Cap.
C8	10	25	45A121	PRS25/10	BR102A		TVA-5	Output Cathode Bypass
C9	300		47B20331K5			GP2K-300		RF Coupling
C10	300		47B20331K5			GP2K-300		RF Coupling
C11	1500		47B2015K5			GP2L-0015		AGC Filter
C12	1.5		47A160-3			NP0K-1.5		Neutralizing
C13	1.5		47A160-3			NP0K-1.5		Neutralizing
C14	500		47B20501K5			GP2K-500		RF Filament Bypass
C15	1500		47B2015K5			GP2L-0015		Mixer Grid Filter
C16	500		47B20501K5			GP2K-500		Decoupling
C17	4.7		47A160-6			N750K-5		Osc. Feedback
C18	4.7		47A160-6			N750K-5		Osc. Feedback
C19	500		47B20501K5			GP2K-500		Osc. Filament Bypass
C20	1.5		47A160-3			NP0K-1.5		Fixed Trimmer §
C21	1000		47B20A102SN			GP2L-001		Mixer Plate Decoupling
C22	100		47B2010K5	1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C23	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	AGC Filter
C24	.25	200	46AT254J	P486-25	GT2P25		TC-2	AGC Filter
C25	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	1st V. IF Decoupling
C26	100		47B2010K5	1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C27	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	AGC Filter
C28	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	2nd V. IF Fil. Bypass
C29	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	2nd V. IF Decoupling
C30	100		47B2010K5	1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C31	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	AGC Filter
C32	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	3rd V. IF Decoupling
C33	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	RF Bypass
C34	.25	200	46AT254J	P486-25	GT2P25		TC-2	AGC Filter
C35	100		47B20101K5	1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C36	5000		47A168	1467-005	1D5D5	811-005	29C1	4th V. IF Decoupling
C37	100		47B20101K5	1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C38	.05	200	46AU50J	P286-05	GT6S5		TM-15	Video Coupling
C39	.05	600	46AY50J	P688-05	GT6S5		TM-15	Video Coupling
C40	470	500	47B20A471M	1468-0005	5W5T5	GP2K-470	1FM-35	2nd V. Amp. Cath. Bypass
C41	.05	600	46AY50J	P688-05	GT6S5		TM-15	Video Coupling
C42	.25	600	46AA25AJ	684-25	GT6P25		TC-2	Video Coupling
C43	.05	600	46AY50J	P688-05	GT6S5		TM-15	Video Coupling
C44	3.3		47A160-5					S. IF Coupling
C45	.01	200	46AU103J	P488-01	GT2S1	GP2-335-01	TM-11	S. IF Decoupling

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HALLICRAFTER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C46	330		47B2A331K5	1468-0003	5W5T3	GP2K-330	1FM-335	Diode Load Cap. ‡
C47	330		47B2A331K5	1468-0003	5W5T3	GP2K-330	1FM-335	Diode Load Cap. ‡
C48	1000		47B20A102SN	1468-001	1W5D1	GP2L-001	1FM-21	De-emphasis
C49	.01	600	46AY103J	P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C50	.01	600	46AY103J	P688-01	GT6S1	GP2-335-01	TM-11	AF Screen Bypass
C51	500		47X20A471M	1468-0005	5W5T5	GP2K-500	1FM-35	AF Plate Bypass
C52	.01	600	46AY103J	P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C53	.002	600	46AA20AJ	P688-002	GT6S2	GP2M-002	TM-22	Integrator Net.
C54	.005	600	46AA50AJ	P688-005	GT6S5	GP2M-005	TM-25	Integrator Net.
C55	4700	500	47A5A472K	1467-005	1D5D5	GP2M-005	1FM-25	Vert. Osc. Grid Cap.
C56	.1	600	46AY104J	P688-1	GT6P1		TM-1	Vert. Discharge
C57	.25	600	46AA254J	684-25	GT6P25		TC-2	Vert. Sweep Coupling
C58	1500	500	47AA30A152K	1467-0015	1W5D15	GP2L-0015	1FM-215	Hor. Sync. Coupling
C59	1500	500	47AA30A152K	1467-0015	1W5D15	GP2L-0015	1FM-215	Hor. Sync. Coupling
C60	.005	600	46AA50AJ	P688-005	GT6S5	GP2M-005	TM-25	AFC Filter
C61	.005	600	46AA50AJ	P688-005	GT6S5	GP2M-005	TM-25	AFC Filter
C62	47	500	47A20A470K	1468-00005	5W5A5	GP1K-47	1FM-45	Hor. MV Feedback
C63	330	500	47A2A331K	1468-00035	5W5T3	GP2K-330	1FM-335	Hor. MV Feedback
C64	6200	500	47A35A622J					Fixed Trimmer
C65	560	500	47A20A391M	1468-00035	5W5T4	GP2K-390	1FM-335	Hor. Discharge
C66	1500	500	47A20A152M	1467-0015	1W5D15	GP2L-0015	1FM-215	Hor. Sweep Coupling
C67	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	Voltage Divider **
C68	.25	600	46AA254J	684-25	GT6P25		TC-2	Hor. Output Cath. Bypass
C69	.035	600	46AY53J	P688-033				Damper Filter
C70	.1	600	46AY104J	P688-1	GT6P1		TM-1	Damper Filter
C71	.05	400	46AY50J	P488-05	GT4S5		TM-15	Fixed Trimmer §
C72	500	10000	47A178					HV Filter
C73	.01	600	46BR103L6	P688-01	GT6S1		TM-11	Line Filter
C74	.01	600	46BR103L6	P688-01	GT6S1		TM-11	Line Filter
C75	.1	200	46AU104J	P288-1	GT2P1		TM-1	Pic. Tube Cath. Decoup.
C76	1000	500	47A20A102M	1468-001	1W5D1	GP2L-001	1FM-21	Hor. Feedback †

‡ When either item C48 or C49 are replaced, replace both with capacitors of equal value.
§ Not used in all models.
# Use mounting strap.
* Parallel sections to obtain desired capacity.
** Not used in model 520E
† Model 520E uses .1-600V in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFT. PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	25A785	Q13-137	AM-63-Z	Volume control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions
R2A	50KΩ	½	25B784	Q11-123	AM-44-S	Brightness control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R2A per instructions
R3	2500Ω	2	25B783			Contrast control, Wire Wound
R4A	1 Meg.	½	25B786	B11-137 *		Vert. hold control, rear (Dual Concentric)
B	50KΩ	½		B11-123 *		Horiz. hold control, front
C	Shaft End			2202 *		Attach per instructions in "Concentrikit"
R5A	500KΩ	½	25B769	Q11-114	AM-19-S	Vert. linearity control
B	Shaft		Not Req.	RQ	KSS-3 #	Attach to R5A per instructions
R6A	2.5Meg.	½	25B768	Q11-239	AM-84-S	Height control
B	Shaft		Not Req.	RQ	KSS-3 #	Attach to R6A per instructions
R7	20Ω	2	25B707	W-20	43-20	Horiz. centering control, Wire Wound
R8	20Ω	2	25B706	W-20x10	45-20CT	Vert. centering control, Lapped @ 10Ω
R9	500Ω	4	25B709		10-500	Focus control, Wire Wound

* Additional parts to be used with "Concentrikit".
# File shaft to duplicate original.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTER PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R10	150Ω	½	23X20X151K		RF Grid
R11	150Ω	½	23X20X151K		RF Grid
R12	100Ω 20%	½	23X20X132K	BTS-1000	AGC Network
R13	10KΩ	½	23X20X103K	BTS-10K	RF Plate Coil Shunt
R14	100Ω 20%	½	23X20X102K	BTS-1000	RF Plate
R15	100Ω 20%	½	23X20X102K	BTS-1000	RF Plate
R16	560Ω	½	23X20X562K	BTS-5600	Mixer Grid Coil Shunt
R17	1 Meg. 20%	½	23X20X105K	BTS-1 Meg.	Mixer Grid
R18	100KΩ 20%	½	23X20X104K	BTS-100K	Osc. Grid
R19	100KΩ 20%	½	23X20X104K	BTS-100K	Osc. Grid
R20	100Ω 20%	½	23X20X102K	BTS-1000	Osc. Plate
R21	100Ω 20%	½	23X20X102K	BTS-1000	Osc. Plate
R22	33Ω 20%	½	23X20X330M		Parasitic Supp.
R23	470Ω	1	23X30X472K		Mixer Plate Decoupling
R24	680Ω	2	23X40X682K	BT-2-6800	Voltage Dropping
R25	820Ω	½	23X20X821K	BTS-8200	1st Video IF Grid
R26	220Ω	½	23X20X222K	BTS-2200	1st Video IF Decoupling
R27	100KΩ	½	23X20X104K	BTS-100K	AGC Network
R28	560Ω	½	23X20X562K		2nd Video IF Grid
R29	68Ω	½	23X20X680K		2nd Video IF Cathode
R30	2200Ω	½	23X20X222K	BTS-2200	2nd Video IF Decoupling
R31	100KΩ	½	23X20X104K	BTS-100K	AGC Network
R32	680Ω	½	23X20X682K		3rd Video IF Grid
R33	68Ω	½	23X20X680K		3rd Video IF Cathode
R34	2200Ω	½	23X20X222K	BTS-2200	3rd Video IF Decoupling
R35	560Ω	½	23X20X562K		4th Video IF Grid
R36	820Ω	½	23X20X822K	BTS-8200	4th Video IF Plate
R37	220Ω	½	23X20X222K	BTS-2200	4th Video IF Decoupling
R38	470KΩ	½	23X20X474K	BTS-470K	AGC Network

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTER PART No.	IRC PART No.	IDENTIFICATION CODES
R39	270Ω	½	23X20X272K	BTS-2700	Video Det. Diode Load
R40	1 Meg.	½	23X20X105K	BTS-1 Meg.	Video Amp. Grid
R41	33KΩ	1	23X20X333K	BTA-3300	Video Amp. Plate
R42	1 Meg.20%	½	23X20X105K	BTS-1 Meg.	Video Output Grid
R43	68Ω	½	23X20X681K	BTS-680	Video Output Cathode
R44	22000Ω	2	23X40X222K	BT-2-2200	Video Output Plate
R45	22000Ω	2	23X40X222K	BT-2-2200	Video Output Plate
R46	100KΩ	½	23X20X104K	BTS-100K	Picture Tube Grid
R47	100KΩ	½	23X20X104K	BTS-100K	DC Rest. Cathode
R48	100KΩ	½	23X20X104K	BTS-100K	Voltage Divider See Note 4
R49	1 Meg.	½	23X20X105K	BTS-1 Meg.	Sync. Amp. Plate
R50	3900Ω	½	23X20X392K	BTS-3900	Sync. Phase Inv. Plate
R51	3900Ω	½	23X20X392K	BTS-3900	Sync. Phase Inv. Plate
R52	1 Meg.	½	23X20X105K	BTS-1 Meg.	Sync. Phase Inv. Grid
R53	3900Ω	½	23X20X392K	BTS-3900	Sync. Phase Inv. Cathode
R54	15KΩ	½	23X20X153K	BTS-15K	Integrator
R55	820Ω	½	23X20X822K	BTS-8200	Integrator
R56	8200Ω	½	23X20X822K	BTS-8200	Integrator
R57	150Ω	½	23X20X154K		Sound IF Grid
R58	33KΩ	½	23X20X333K		Sound IF Decoupling
R59	12KΩ	½	23X20X123K	BTS-12K	Voltage Divider
R60	10KΩ	½	23X20X103K	BTS-10K	Ratio Det. Diode Load
R61	10KΩ	½	23X20X103K	BTS-10K	Ratio Det. Diode Load
R62	33KΩ	½	23X20X333K	BTS-33K	De-emphasis
R63	330Ω	½	23X20X331K	BW-1-330	AF Cathode
R64	4.7Ω	1	23X30X047K	BW-1-4.7	AF Filament
R65	68KΩ	½	23X20X683K	BTA-68K	Voltage Divider
R66	2.2Meg.20%	½	23X20X225M	BTS-2.2 Meg.	AF Screen
R67	470KΩ	½	23X20X474K	BTS-470K	AF Plate
R68	1000Ω	2	23X40X102K	BT-2-1000	AF Decoupling
R69	470KΩ	½	23X20X474K	BTS-470K	Output Grid
R70	680Ω	1	23X30X681K	BTA-680	Output Cathode
R71	37000Ω	5	24BF372E		Filter
R72	1.2 Meg.	½	23X20X125M	BTS-1.2 Meg.	Vert. Osc. Grid
R73	6.8 Meg.20%	½	23X20X685M	BTS-6.8 Meg.	Voltage Divider
R74	100KΩ	½	23X20X104K	BTS-100K	Voltage Divider
R75	1.2 Meg.	½	23X20X125M	BTS-1.2 Meg.	Voltage Divider
R76	1 Meg.	½	23X20X105K	BTS-1 Meg.	Vert. Osc. Plate See Note 5
R77	560Ω	½	23X20X561K	BTS-560	Vert. Output Cathode
R78	33KΩ	½	23X20X333K	BTS-3300	Vert. Output Cathode
R79	2.2 Meg.	½	23X20X225M	BTS-2.2 Meg.	Vert. Output Grid
R80	3300Ω	½	23X20X332K	BTS-3300	Vert. Peaking
R81	100KΩ	½	23X20X104K	BTS-100K	Horiz. Sync. Disc. Load
R82	100KΩ	½	23X20X104K	BTS-100K	Horiz. Sync. Disc. Load
R83	4.7 Meg.	½	23X20X475K	BTS-4.7 Meg.	Horiz. Sync. Disc. Load
R84	100Ω	½	23X20X102K	BTS-1000	Feedback Network
R85	470KΩ	½	23X20X474K	BTS-470K	Horiz. AFC Filter Network
R86	68000Ω	1	23X30X683K	BTA-6800	Horiz. Osc. Plate
R87	1000Ω	½	23X20X102K	BTS-1000	Horiz. Osc. Cathode
R88	68KΩ	½	23X20X683K	BTS-68K	Horiz. Osc. Grid
R89	47KΩ	½	23X20X473K	BTS-47K	Horiz. Hold Control Shunt
R90	220KΩ	½	23X20X224K	BTS-220K	Horiz. Osc. Plate See Note 2
R91	4700Ω	½	23X20X472K	BTS-4700	Horiz. Peaking
R92	47Ω	½	23X20X470K		Parasitic Supp.
R93	470KΩ	½	23X20X474K	BTS-470K	Horiz. Output Grid
R94	68Ω	1	23X30X680K	BW-1-82	Horiz. Output Cathode
R95	22000Ω	2	23X40X222K	BT-2-2200	Horiz. Output Screen
R96	3300Ω	2	23X40X332K	BT-2-3300	Decoupling See Note 1
R97	2.5Ω	½	23X20X025K		HV Filament
R98	470KΩ	1	23X30X474K		HV Filter
R99	10.5MΩ	10	24B0102E	AB-1000	Focus Coil Shunt, Wire Wound
R100	35Ω	10	24B3351E	AB-350	Series Focus Control
R101	13.5Ω	20	24B132E		Filter Wire Wound
R102	11.5Ω	20	24B112D		Filter Wire Wound
R103	250000Ω	25		EP-25000	Damper Filter, Wire Wound, See Note 3
R104	180KΩ	½	23X20X184K	BTS-180K	Voltage Divider
R105	15KΩ	½	23X20X153K	BTS-15K	Voltage Divider

Note 1. Some models use two resistors in parallel to obtain required resistance and wattage
Note 2. Some models use 270KΩ resistor in this application.
Note 3. Not used in all models.
Note 4. Model 520E uses 56KΩ in this application.
Note 5. Model 520E uses 1.5 Meg. in this application.

SPEAKER

ITEM No.	RATINGS: FIELD. RES.	RATINGS: V. C. IMP.	REPLACEMENT DATA: HALLICRAFTER PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1A	65Ω	3.2Ω	85C079 ②		6S ④	④ Supplied on order. State field resistance and current. ② Used in model 512C ③ Used in model 520E
B	65Ω	3.6Ω	85C082 ③		6E ④	
	CONE DIA.	V. C. DIA.				
SP2A	6 1/4"	9/16"	②			
B	7 7/8"	3/4"	③			

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: HALLICRAFTERS PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC ⑤ 2A	760VCT .240ADC ⑤ 3A	5VAC ⑤ 2A DC @ 4	5VAC ⑤ 2A 6.3VAC ⑤ 8.1A	52C170-2	P-8153 ①		TF-410 ①

① Mount vertically with universal mounting brackets.

HALLICRAFTERS MODELS 512C, 513, 515, 520E, 521E, 524

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA HALLICRAFTER PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.	NOTES
T2	42Ω		52C170-2				Hor. Osc. Coil
T3	200Ω	1200Ω	55B115	A-8111	A-3000	TBO-1	Vert.Block Osc.Trans.
T4	500Ω	SEC. 1	55C121	A-8117		TFB-1	Hor. Output Trans.
	Tap ④ 190Ω	14Ω Tap. ④ .7Ω					
		SEC. 2 0Ω					
T5	590Ω	7Ω	55C114	A-8115	A-3035	TSO-1	Vert. Output Trans.
T6A	14Ω		53B140	DY-1			Hor. Deflection Coil
B	69Ω						Vert. Deflection Coil
T7A	240Ω		51B1065 ②	FC-10			Focus Coil
B	450Ω		51C1128 ③				Focus Coil

② Used in model 512C.
③ Used in model 520E.

TRANSFORMER (AUDIO OUTPUT)

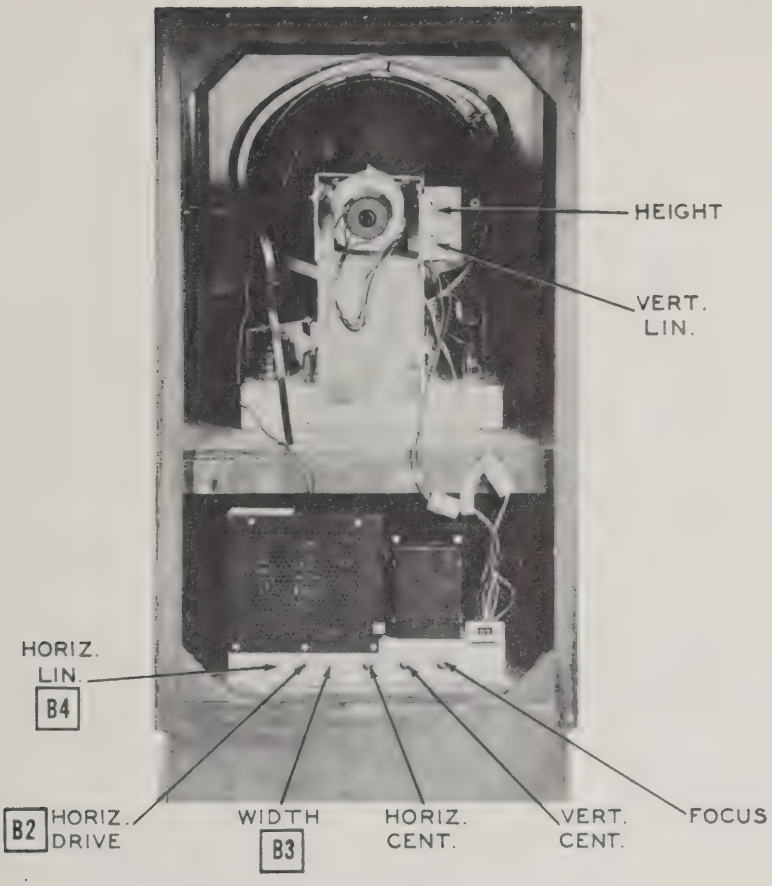
ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA HALLICRAFTER PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.	INSTALLATION NOTES
T8A	7800Ω	3.2Ω	280Ω	.4Ω	Part of 85C079 ②	A-8114	A-2931	RO-13	② Used in model 512C
B	7100Ω	3.6Ω	460Ω	.4Ω	Part of 85C082 ③	A-8114	A-2931	RO-13	③ Used in model 520E

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA HALLICRAFTER PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L1	Ant. Input	0Ω				Part of tuner.
L2	RF Coil	0Ω				Part of tuner. Low Band
L3	Mixer Grid	0Ω				Part of tuner. Low Band
L4	RF Coil	0Ω				Part of tuner. High Band
L5	Mixer Grid	0Ω				Part of tuner. High Band
L6	Osc. Coil	0Ω				Part of tuner. Low Band
L7	Osc. Coil	0Ω				Part of tuner. High Band
L8	1st Video IF	.1Ω		50A372-1		
L9	2nd Video IF	.1Ω		50A372-1		
L10	3rd Video IF	.1Ω		50A372-1		
L11	4th Video IF	.1Ω		50A372-1		
L12	5th Video IF	.1Ω		50A372-1		
L13	Peaking	9.1Ω		51A1079		Wound on 39KΩ resistor.
L14	Peaking	12Ω		51A1080		Wound on 1 Meg. resistor.
L15	Peaking	5.9Ω		51A1130		Wound on 47KΩ resistor.
L16	Peaking	5Ω		51A1082		Wound on 1 Meg. resistor.
L17	Peaking	7Ω		51A1131		Wound on 5.6KΩ resistor.
L18	Peaking	6Ω		51A1129		Wound on 1 Meg. resistor.
L19	4.5MC Sound Trap	4.2Ω				
L20	Ratio Det. Transformer	4.5Ω	.8Ω	50B406		
L21	Width Cont.	.2Ω		51B1072		
L22	Hor. Linearity	32Ω		51B1071		

MISCELLANEOUS

ITEM No.	PART NAME	HALLICRAFTER PART No.	NOTES
M1	RF Tuner	1C740	Complete
M2	Fuse	39A334	Type 3AG .25A
M3	Ion Trap	21B083-2	Permanent Magnet Type
	Knob	15B147-2	Vert. hold, Fine tuning
	Knob	15B146	Hor. hold
	Knob	15B148-2	Brightness, Contrast, On-Off Volume
	Knob	15B151-3	Channel Selector



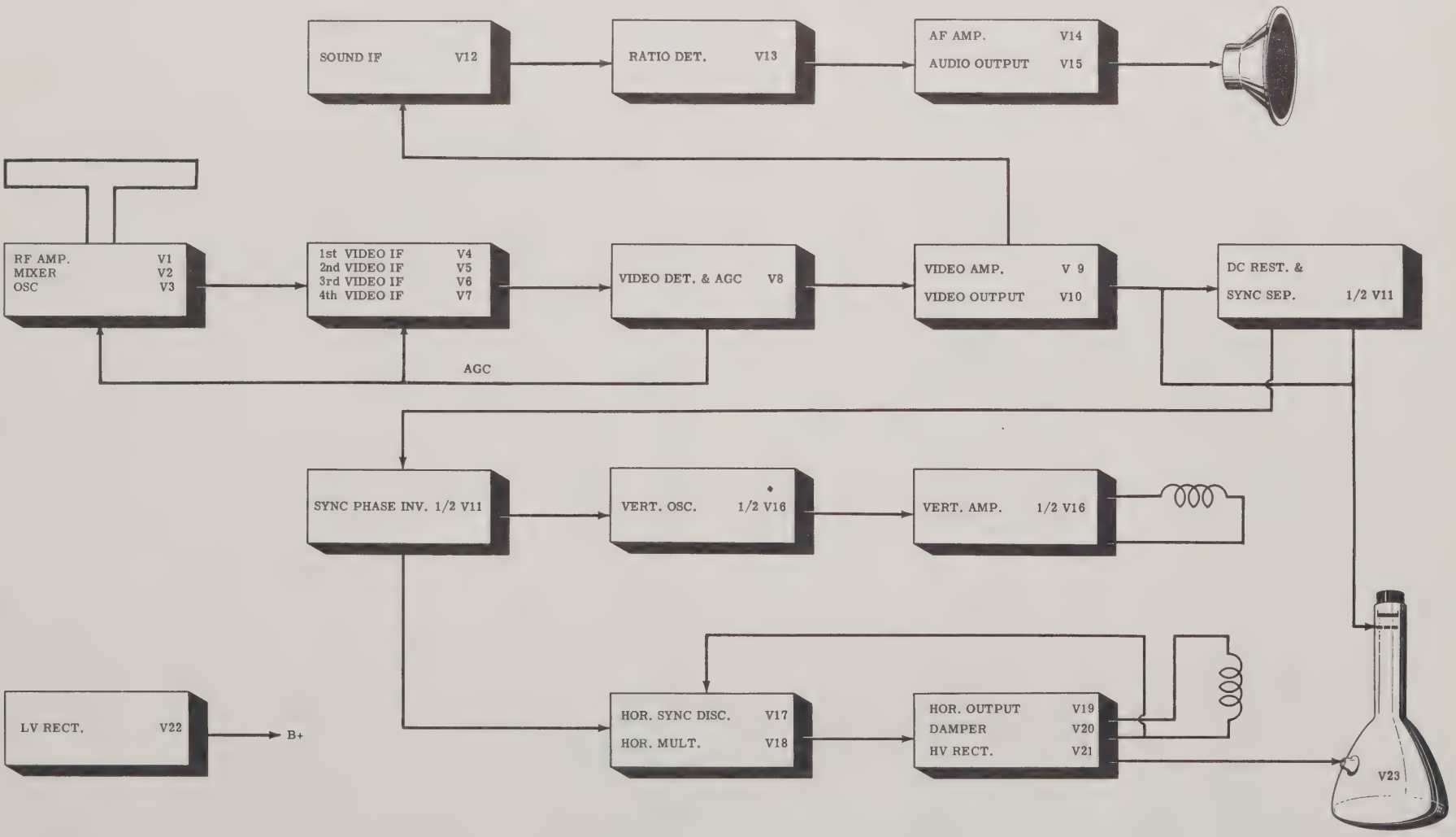
CABINET—REAR VIEW

DISASSEMBLY INSTRUCTIONS

1. Remove 5 push-on type control knobs.
2. Remove 18 screws holding rear cover. Remove cover.
3. Disconnect HV lead from picture tube.
4. Disconnect 2 plugs from lower chassis.
5. Disconnect 2 plugs leading to deflection yokes.
6. Remove 4 screws holding lower chassis in cabinet. (2 of these screws must be removed from under cabinet.)
7. Disconnect speaker plug.
8. Remove 4 screws holding picture tube chassis to cabinet. (2 of these screws must be removed from under cabinet.) Remove picture tube chassis.
9. Remove four 3/8" hex nuts holding speaker. Remove speaker.

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably a test pattern. Turn the contrast control to its normal setting.
2. Set the horizontal hold control to the mid-position of its rotation.
3. Adjust the horizontal frequency slug (B1) to the center of the range over which the picture synchronizes horizontally.
4. Adjust the horizontal drive trimmer (B2) clockwise as far as possible without crowding the right side of the picture.
5. Adjust the width slug (B3) until the picture fills the mask horizontally.
6. Adjust the horizontal linearity slug (B4) for best picture symmetry from left to right. It may be necessary to slightly readjust B2 for optimum horizontal linearity.



BLOCK DIAGRAM

FIG. 1—RADIO AND SPEAKER UNIT

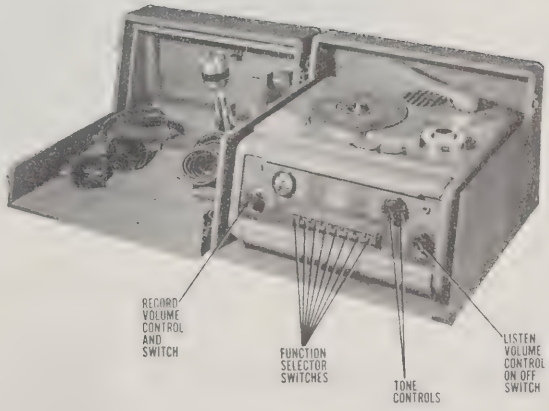


FIG. 2—LEARECORDER UNIT—MIKE AND HEADPHONES

GENERAL INFORMATION

The Lear Dynaport is a combination Radio, Record Player, and a magnetic Recorder-Reproducer. The turntable serves not only as a turntable for standard 78 R.P.M. records, but also as the takeup spool for wire recording mechanism. The standard spool of wire contains enough .004" stainless steel wire for an hour of continuous recording.

The Lear uses a single motor which drives the mechanism through its various operations by the solenoid-operated pulley assemblies, which are controlled by the push buttons.

Although a standard spool of wire requires a full hour from start to finish, the Learecorder incorporates a special "Skip" speed control enabling the user to skip over an unwanted part of the wire and come to the desired recording in just a few moments. An automatic program "Cue Meter" on the Learecorder is used as a time indicator for recording.

Recordings may be made on the wire from a recording being played on the turntable, from the radio or from the microphone.

The Lear Dynaport is designed to operate on 105-125 volts, 50-60 cycles AC. Best results are obtained when recordings and playbacks are made at the same frequency; that is, if a recording is made with equipment plugged into 60-cycle supply, it should be played back on the same supply. If a recording is made on 60-cycle supply and the unit is moved and played back on 50-cycle supply later, the recording will not sound natural since the wire speed is about 17% less than normal, lowering the pitch of all recorded sounds. If the above operation is reversed, the wire will run about 17% faster, thus raising the pitch. If 50-cycle operation is necessary, a special 50-cycle motor should be installed.

A recording will last indefinitely, since the playback process has no effect on the wire; or new recordings may be made on an old spool inasmuch as in the recording process any previous recording is erased.

A special locking device on the Learecorder safeguards recorder spools of wire when the key is removed from the lock. This breaks the circuit to the three record push buttons, which prevents the mechanism from being operated when these buttons are depressed.

Manufactured by: **LEAR, INCORPORATED • 110 Ionia Avenue, N. W. • Grand Rapids 2, Mich., U.S.A.**

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LEAR DYNAPORT
MODEL WC-311-D

LEAR DYNAPORT
MODEL WC-311-D

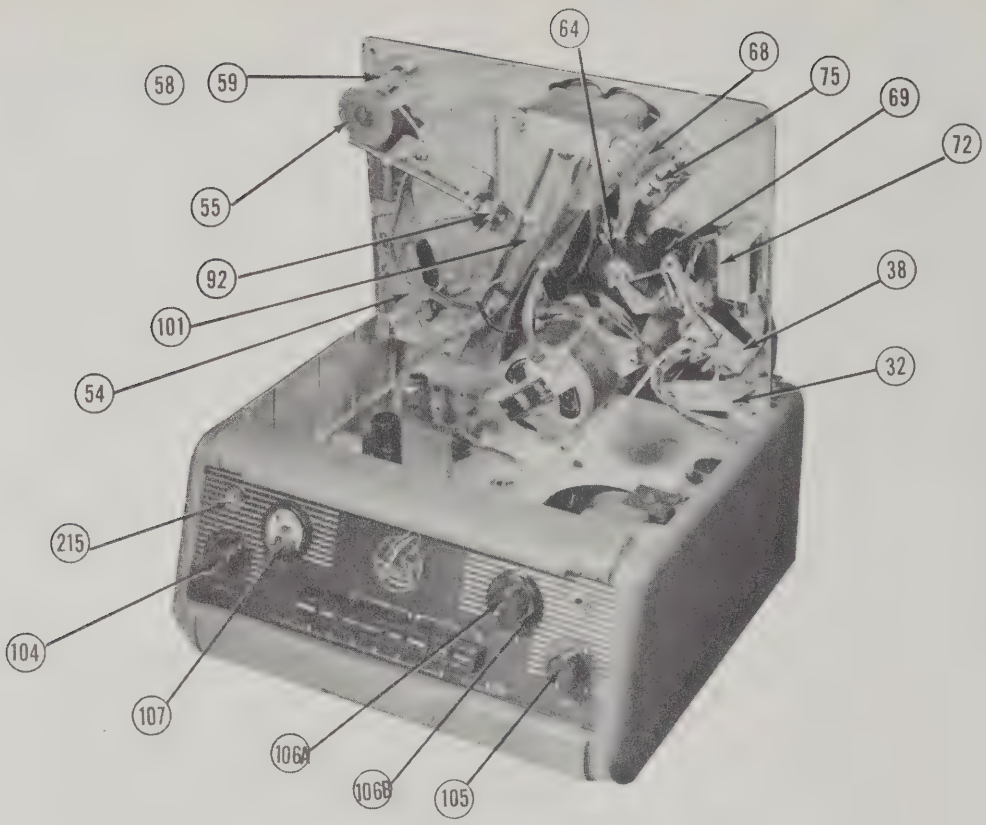

FIG. 3—LEARECORDER UNIT

OPERATING INSTRUCTIONS

1—Assembling the Lear Dynaport

(a) Remove the case covers on each carrying case.

(b) Place the units side by side, or the recorder unit on the top of the radio and speaker unit.

(c) Remove the hinged doors on each case.

(d) The two cables stored in the rear of the radio case; one is a multiple pin power cable, and the other is a two-pin cable. These must be plugged into their respective sockets in the rear of the recorder unit.

(e) Insert the line cord, stored in the rear compartment of the recorder case, into a convenient wall receptacle of proper rating (105-120 volt, 50-60 cycle AC).

CAUTION: Any other source of supply may damage the units.

2—Push Button Controls

(a) The operation of the mechanism is entirely controlled by the push buttons. The push button unit is so designed that the "Stop" button or "Listen-Radio" button must be depressed before any other push button can be depressed.

(b) The first seven buttons (beginning at the left) are indicated as "Start" buttons. Depressing any one of these buttons starts the mechanism operating. The eighth, or extreme right-hand, button marked "Radio," stops the mechanical unit, making possible the use of the radio section only.

(c) The first button "Rewind" is for rewinding the wire back on the spool.

(d) The second button "Skip" is used for a rapid, forward speed, enabling the user to pass over an unwanted portion of the recording in a few moments.

(e) The third, fourth, and fifth buttons are for recording.

(f) The sixth, seventh, and eighth are used for listening.

3—Radio Programs

(a) Depress the "Listen-Radio" button.

(b) Turn the "Listen" Volume control knob clockwise until the white dot on the knob is opposite No. 2.

(c) Allow a few seconds for the tubes to warm up.

(d) Tune in the desired program with the tuning control knob. This is the only knob on the radio and speaker unit.

(e) Adjust the tone controls as desired.

4—Tone Controls

(a) The dual tone controls have been designed to permit many variations. These controls can be individually increased, decreased or blended to suit the musical taste.

NOTE: The tone controls have no effect on the sound being recorded on the wire. The tone controls are effective only for listening.

5—To Load Wire

(a) Loosen the spool holder nut (8) so as to allow the spool of wire to slide over the holder (9).

(b) Slide the spool of wire over the holder until it is fully seated. Be sure the spool is placed on the spool hub so that it turns clockwise as the wire is pulled from the spool.

(c) Tighten the spool holder nut (8).

(d) Pull the wire past the record and playback heads, making sure the wire contacts the grooves in the heads. (If the wire does not contact the grooves, the mechanism will not operate.)

(e) Pull the wire through the slot in the rim of the turntable (6) and secure the end of the wire under the spring clip in the center of the turntable.

(f) Rotate the turntable clockwise a few revolutions to see if the wire contacts the grooves of the heads and that the spool of wire is turning in a clockwise direction.

6—The Cue Meter

(a) The Cue Meter (17) is operated by the rotation of the turntable through the gear (93) and shaft (94). The Cue Meter is used as a time indication for recording.

(b) When a new spool of wire is threaded on the turntable, be sure the Cue Meter is turned to "Zero."

(c) Jot down the dial reading of the Cue Meter on the cue sheets at the start and finish of each recording.

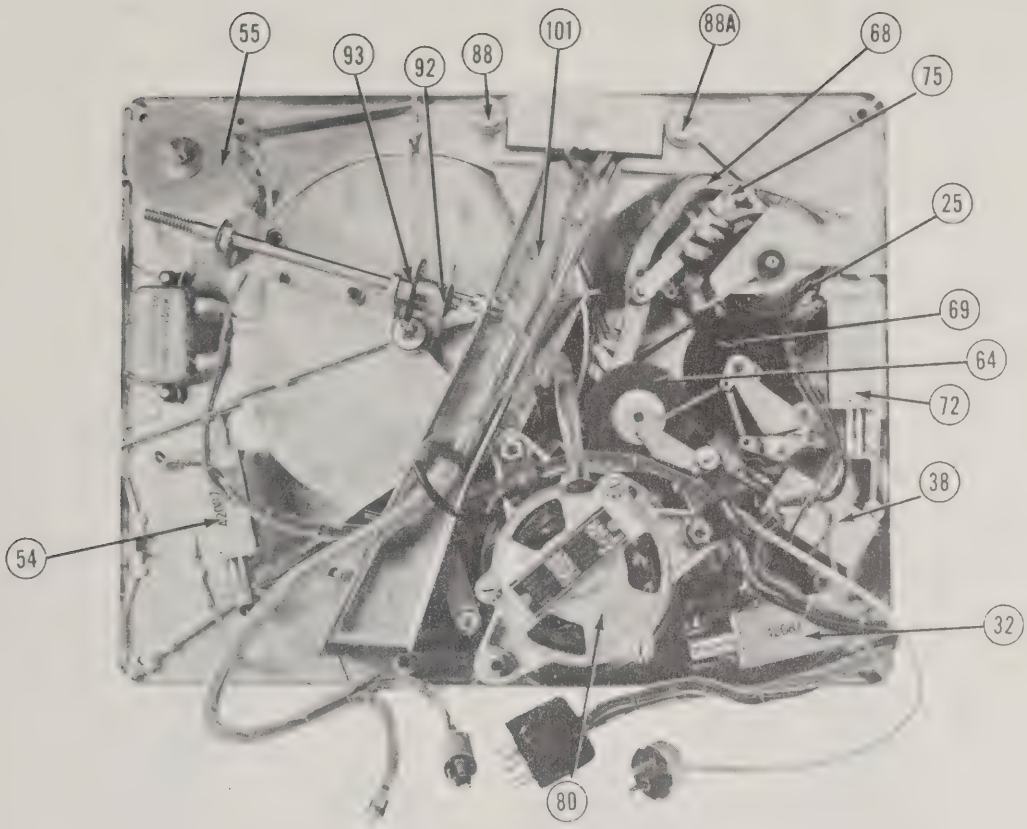

FIG. 4—BOTTOM VIEW

(d) After a spool of wire has been recorded, a recording may be singled out and played back by observing the dial reading and rewinding or skipping at high speed; that is, in case the wire has been rewound, to the start of the recording.

(e) To stop the mechanism at the desired point, press the "Stop" button.

7—"Skip" Button

(a) The "Skip" button, when depressed, allows the mechanism to move the wire forward at a rapid speed.

(b) By following the instructions on the "Cue Meter," paragraph 6, any selection may be passed over and, by observing the Cue Meter, stopped at the desired selection by depressing the "Stop" button.

8—Rewinding

(a) In order to rewind all or any portion of the wire back on the spool, depress the "Rewind" button.

(b) By following the instructions on the "Cue Meter," paragraph 6, the wire may be rewound at high speed, and, by observing the "Cue Meter," stopped at the start of the desired selection by depressing the "Stop" button.

(c) In rewinding all of the wire on to the spool, the mechanism will operate until all the wire has been taken up on the spool, at which time the unit will shut off automatically.

NOTE: After the unit shuts off, be sure to depress the "Stop" button. If the "Stop" button is not depressed, the unit will be put in motion (Rewind) each time the wire comes in contact with the grooves of the heads.

9—Recorder Lock

(a) The purpose of the Recorder Lock is to prevent unintentional or unauthorized recordings.

(b) When the key is in a vertical position, or removed from the lock, the instrument will not record on the wire; however, this does not interfere with the use of the instrument in listening to wire recordings, the phonograph or the radio.

(c) In order to make a recording, the key must be inserted in the lock and turned in a clockwise direction.

10—Recording Radio Programs

After the radio has been tuned to the desired program, the following procedure is necessary to properly record and edit the program:

(a) *Note* the "Cue Meter" reading.

(b) Turn on the "Record Volume Control" knob located on the left-hand side of the recorder unit.

(c) Insert the key into the Recorder Lock.

(d) Depress the Record-Radio push button.

(e) Adjust the "Record Volume Control" knob until the pointer of the Level Indicator moves freely into upper limits of the green portion of the scale on extreme loudness peaks only.

(f) Turn the Recorder Lock Key clockwise.

(g) The Listen Volume Control may be adjusted for desired room volume.

(h) The recording may be stopped at any time by depressing the "Stop" button.

(i) Note the "Cue Meter" reading.

(j) When finished recording, turn the lock switch and Record Volume Control off.

11—Microphone Recordings

(a) Be sure the microphone cable is plugged in at the rear of the "Learecorder."

(b) *Note* "Cue Meter" reading.

(c) Turn on the Listen Volume Control.

(d) Turn the Record Volume Control on and adjust as in paragraph 10.

(e) Depress the Record "Mike" push button.

(f) Turn the Recording Lock Key clockwise. The mechanism is now operating and will record any sounds picked up by the microphone.

(g) The loud speaker of the Dynaport does not operate when recording with the "Mike." This is to prevent genera-

A PHOTOFACT "EXPLODED" VIEW

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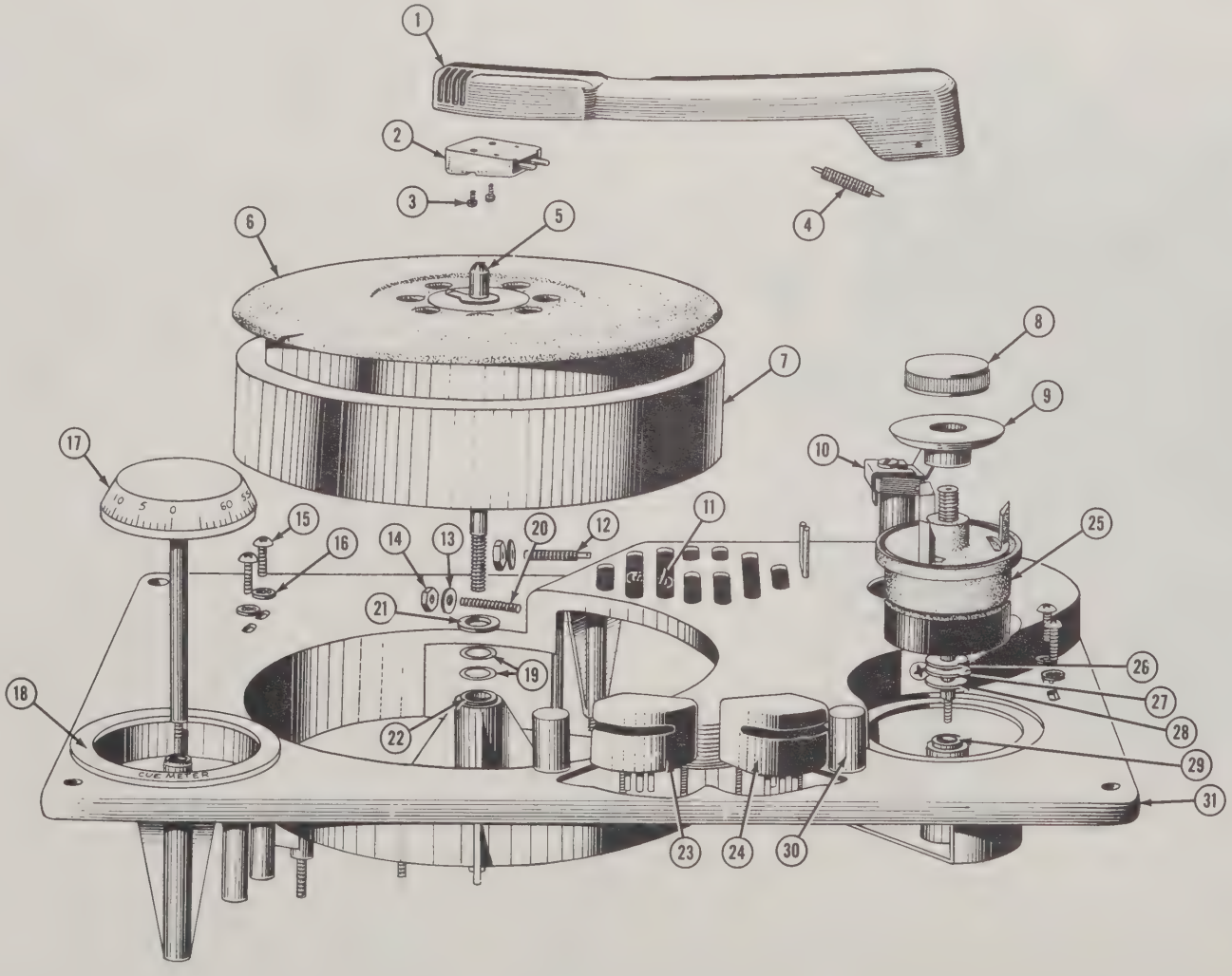

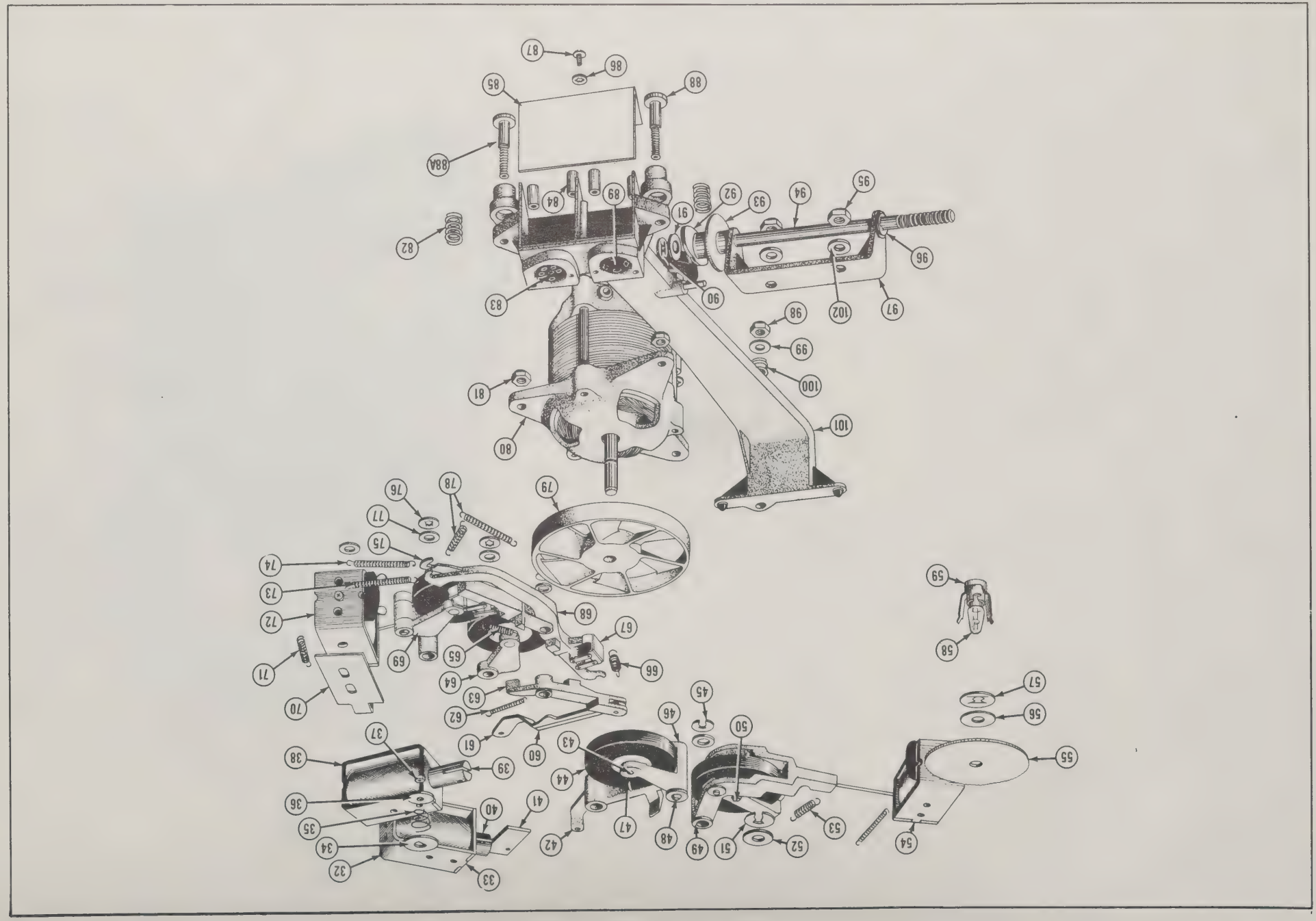
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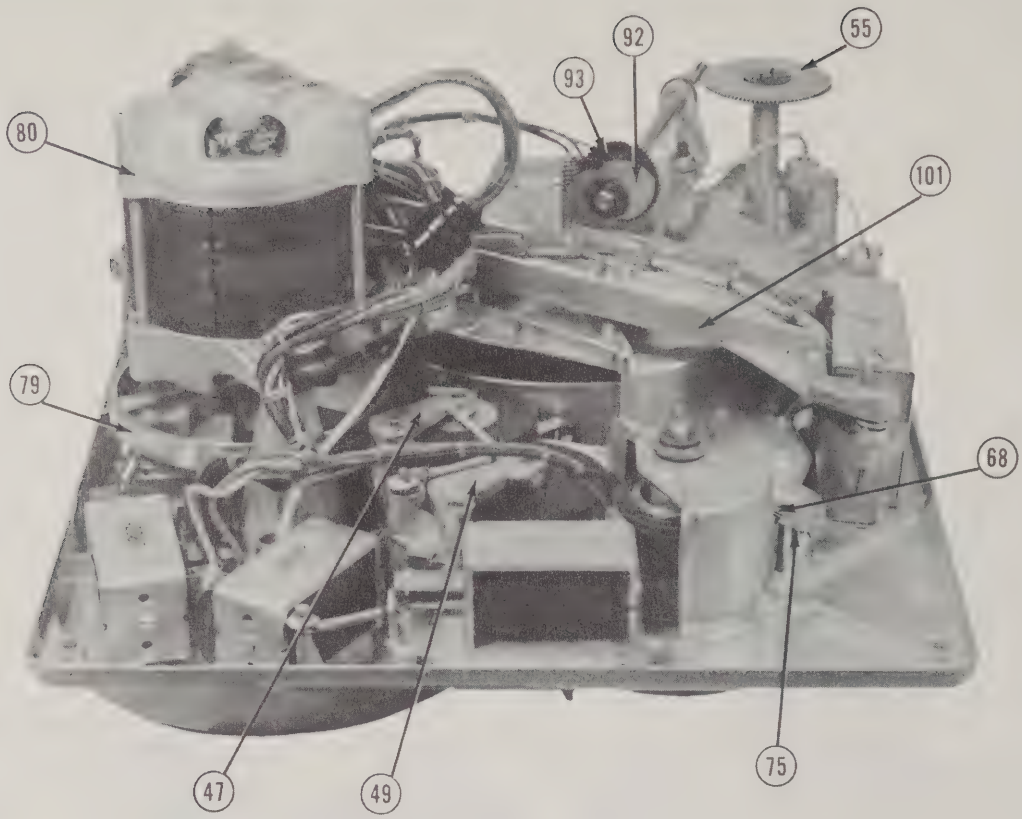


FIG. 5—SIDE VIEW

tion of an unpleasant howl when the sound from the loudspeaker is allowed to enter a microphone connected to the same amplifier. However, the signal may be picked up by plugging in the headphones. The headphone jack is located on the front panel in the upper right-hand corner of the recorder unit.

(h) To stop the recorder, depress the "Stop" button.

(i) Note the "Cue Meter" reading.

(j) Turn the "Recorder Lock Switch" off after a recording is made.

12—To Record Phonograph Records

(a) Be sure all the wire is rewound on the spool.

(b) Place the record on the turntable.

(c) *Note* the "Cue Meter" reading.

(d) Turn on the Listen Volume control.

(e) Adjust the Record Volume Control as in paragraph (10).

(f) Depress the Record-Phono button.

(g) Turn the Record Switch Key on.

(h) Place the pickup arm on the record.

(i) Depress the "Stop" button when through with record.

(j) *Note* "Cue Meter" reading.

(k) Place pickup arm on rest post and remove record.

(l) Turn Lock Switch to "Off" position.

13—To Play Phonograph Records

(a) Be sure all the wire is rewound onto the spool.

(b) Turn on the Record Volume Control.

(c) Place a record on the turntable.

(d) Depress the Listen-Phono button.

(e) Place the pickup arm on the record.

(f) Adjust the Volume Control and Tone Control as desired.

(g) To shut the mechanism off, depress the "Stop" button.

(h) Place the pickup arm on the rest and remove the record.

14—To Play Back Recordings

(a) Load the wire as described in paragraph (5).

(b) Turn the Record Volume Control on.

(c) Depress the Listen-Wire Button.

(d) Adjust the Volume and Tone Controls as desired.

(e) To stop the mechanism, depress the "Stop" button.

15—Erasing Undesired Parts of a Recording

(a) The location of the unwanted portion of a recording may be determined by playing the recording back and noting the Cue Meter readings at the start and finish of the recording.

(b) Rewind the wire to the start of the unwanted section and depress the "Stop" button.

(c) Turn the Record Volume Control counterclockwise as far as it will go without shutting off the motor.

(d) Turn the Listen-Volume control knob to the No. 2 or 3 position so that you check the erasure while wire travels past the playback head.

(e) Depress the Record-Phono button.

(f) Turn key in Lock Switch.

(g) Note Cue Meter reading and stop the wire at the end of the unwanted portion by depressing the "Stop" button.

(h) New recordings may be recorded on the blank space by rewinding the wire to the start of the blank section.

(i) Recording may now be made as described in paragraphs 10, 11, and 12.

16—To Mend Break in Wire

(a) If the wire breaks, the unit shuts off automatically, but be sure to depress the "Stop" button before attempting to mend wire. If the wire comes in contact with the grooves of the heads before the wire is properly tied, the mechanism will start operating.

(b) Unwind several turns of wire from the spool to be sure the outside strand of wire on the small spool has not passed under one of the other strands.

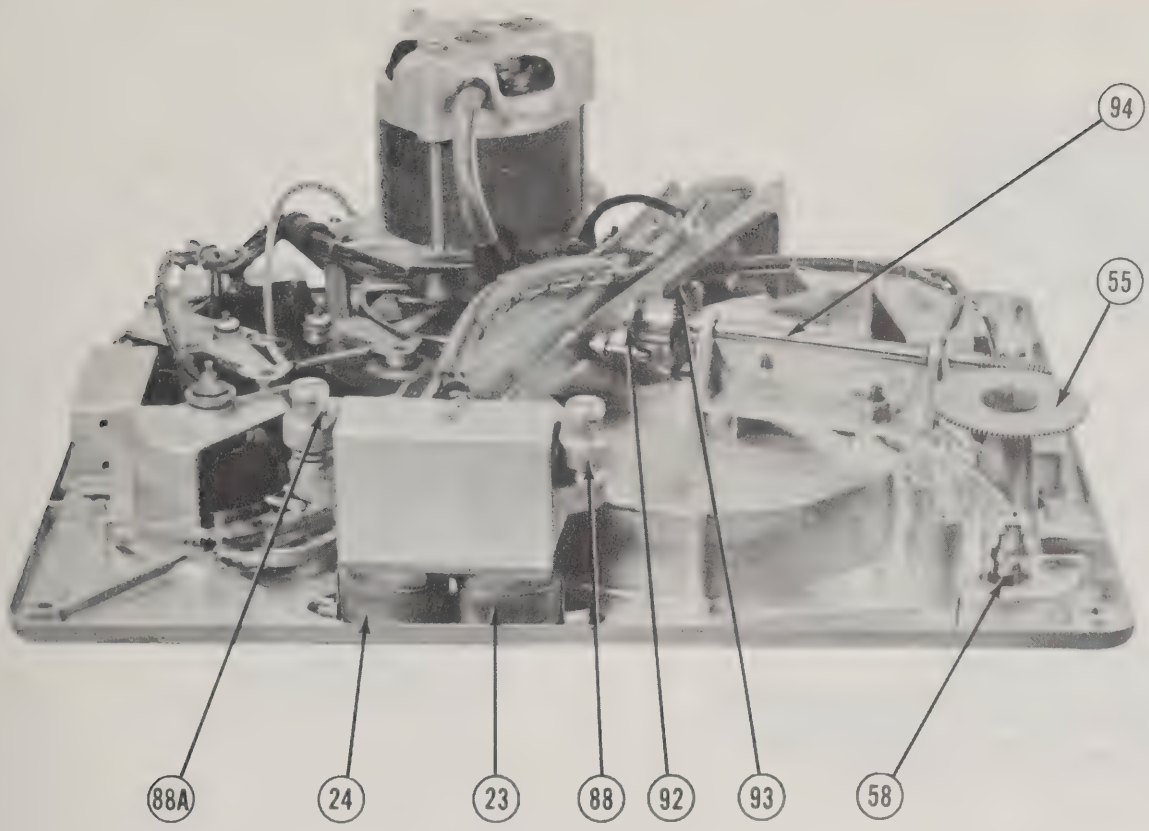


FIG. 6—FRONT VIEW

(c) The wire may now be mended by tying the loose ends together by a square knot.

(d) Rotate either the turntable or spool to take up slack. Be sure wire contacts groove of the heads.

(e) The unit is now ready for operation.

17—Cleaning Record and Playback Heads

The heads should be cleaned periodically to remove accumulation of foreign matter and dust. To clean the grooves of the head, use a stiff-bristle brush moistened with carbon tetrachloride or alcohol. After the heads have been cleaned, run a fine thread, such as No. 100 Sewing Cotton, through the grooves to absorb and remove the accumulation.

ADJUSTMENTS

Drive Screw

(a) If loops of wire are thrown when the mechanism is started, or if the wire does not move when any of the "Start" buttons are depressed, the drive screw (20) must be adjusted to obtain proper operation.

If loops of wire are thrown when the mechanism is started, the drive screw (20) must be turned in. Adjust this screw until the recorder shows no tendency to throw the wire. If the screw is turned in too far, the mechanism may then fail to drive the wire, at which time the screw will have to be turned out.

Level Wind Adjustment

The correct level wind is when the wire winds evenly in a straight line, up and down on the spool or turntable, without bunching or becoming coneshaped.

(a) If the wire winding becomes coneshaped (larger portion at bottom of spool) in rewinding the wire onto the storage spool, the head adjusting screw (88A) must be turned ¼ turn in a clockwise direction. Be sure to wind the wire on the turntable by depressing the "Skip" button before the adjustment is made.

The screw is made accessible through the baseplate (31) near the erase head (24). A 3/32" Allen wrench is used for the adjustment.

(b) Rewind the wire on the storage spool and check the adjustment. Repeat the procedure, if necessary, until the wire is wound evenly on the spool.

(c) If the wire bunches up at the top of the spool, turn the adjusting screw (88A) in a counterclockwise direction.

(d) If the wire bunches up on the bottom of the turntable, rewind the wire onto the storage spool and turn the adjusting screw (88) in a clockwise direction ¼ turn; then depress the "Skip" button to check the adjustment.

(f) If wire bunches up at the top of the turntable, turn the screw (88) in a counterclockwise direction.

TROUBLES

Unit Fails to Operate

(a) Check to see if the two units are assembled properly. See "Assembling the Lear Dynaport," paragraph 1.

(b) Check Listen Volume Control On-Off Switch.

(c) Check the fuse; it may be blown.

Recorder Unit Fails to Operate

(a) Check to see if pulley assembly (47) contacts the turntable rim. See adjustment on Drive Screw.

(b) Check all springs to see if they are fastened in their proper places.

(c) Check to see if the wire contacts the grooves of the heads.

(d) Check for oil or foreign material on pulley tires.

Wire Overruns When the Stop Button Is Depressed

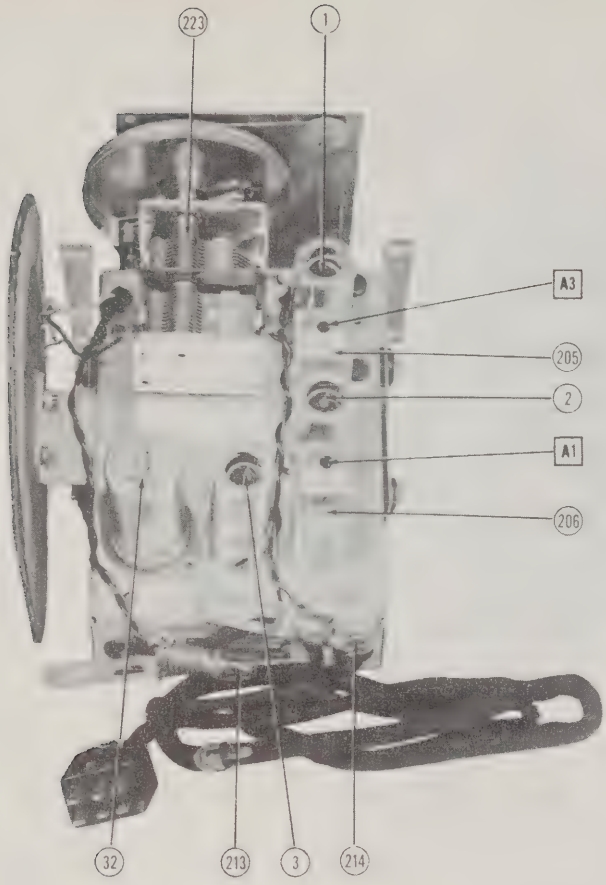
(a) Springs (73) and (74) loose.

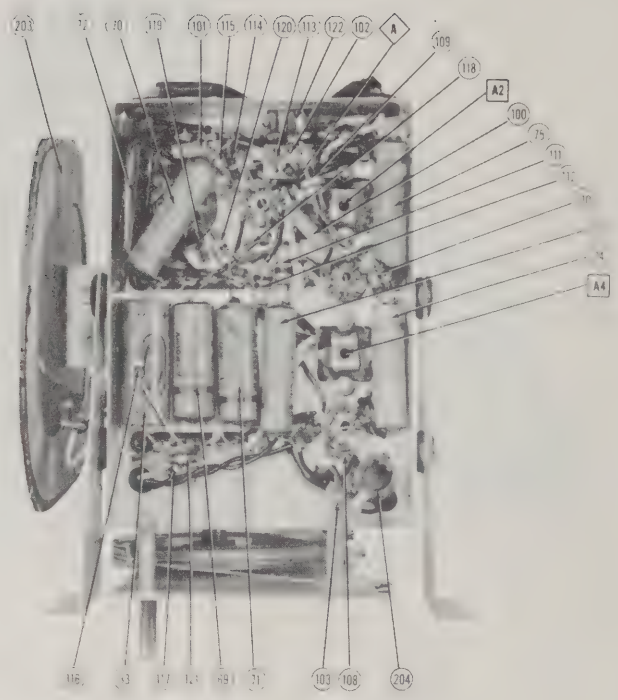
(b) Brake shoes missing.

Mechanism Will Not Operate in Record

(a) Be sure the key is turned in the Lock Switch.

(b) Check drive screw (20) to see if it is adjusted properly. See adjustment on "Drive Screw."





ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 7/8" from left end of dial backplate. This is the calibration mark referred to in Steps below.

In Final IF Alignment Using FM Signal Generator and Oscilloscope use 120 ∿ sawtooth voltage in scope for horizontal deflection.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting

PRELIMINARY IF ALIGNMENT USING AM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (grid) of 6BE6. Low side to chassis.	455KC (400 ∿ modulation)	Tuning cap. fully open.	Vertical input to Point (A). Ground to chassis.	A1,A2, A3,A4	Turn horizontal gain on scope to minimum. Adjust A1 thru A4 for maximum height of vertical scope line per Fig. 1.

FINAL IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (grid) of 6BE6. Low side to chassis.	455KC (Freq. Mod. ± 11KC and 60 ∿ modulation)	Tuning cap. fully open.	Vertical input to Point (A). Ground to chassis.	A1,A2, A3,A4	Connect short across small section of tuning cap. Adjust A1 thru A4 for maximum amplitude, symmetry and coincidence of pattern per Fig. 2. Remove short from small section of tuning cap. Continue with RF Alignment in Step 2.

RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
2		Loop	1400KC	3-11/16" from calibration mark.	Across voice coil	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	"	Tune for maximum output.	"	A6	Adjust for maximum output.

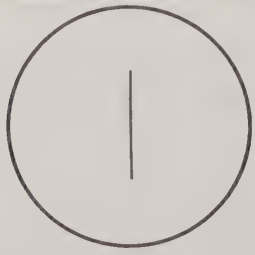
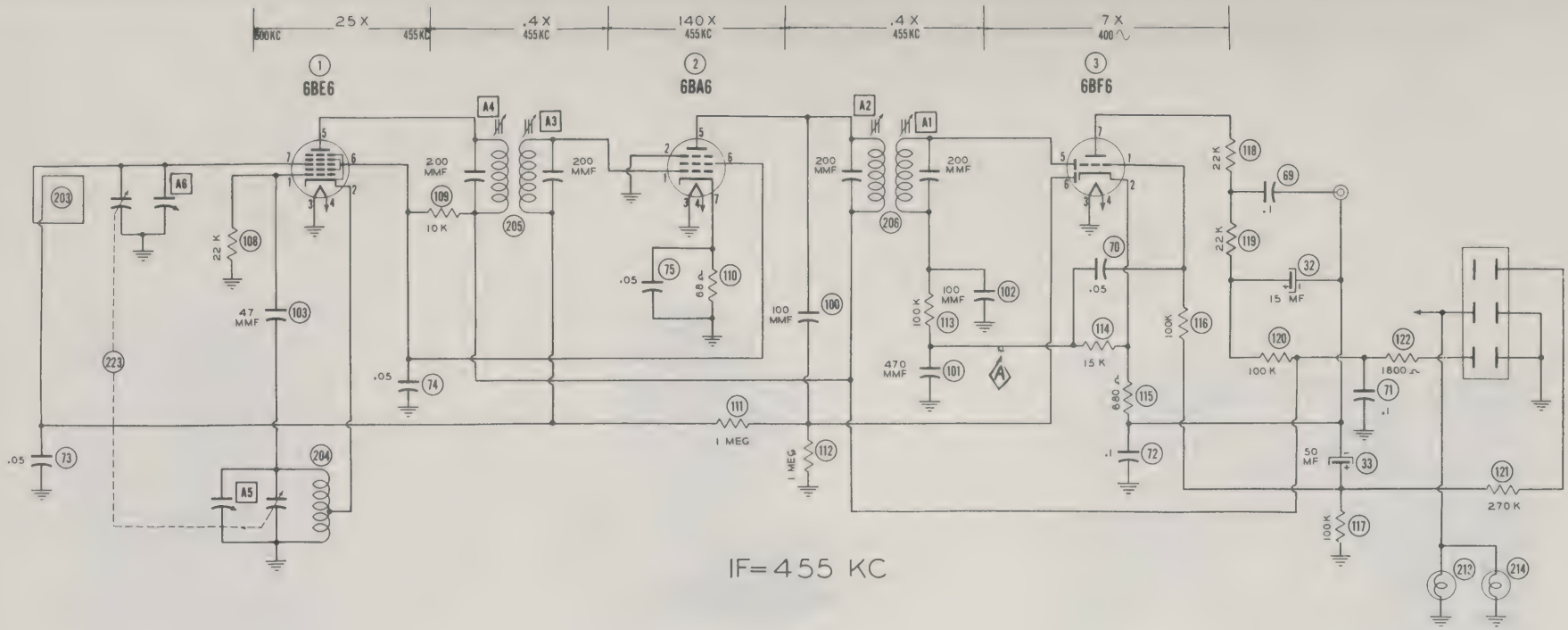


FIG. 1

FIG. 2



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	6BE6	-6.4VDC§	0V.	0V.	6.7VAC	245VDC	95VDC	0V.
2	6BA6	0V.	0V.	0V.	6.7VAC	245VDC	95VDC	1.2VDC
3	6BF6	-3.2VDC	.6VDC	0V.	6.7VAC	.3VDC	-.3VDC	110VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	6BE6	22KΩ	.5Ω	0Ω	.1Ω	42KΩ	52KΩ	2 Meg.
2	6BA6	2 Meg.	0Ω	0Ω	.1Ω	42KΩ	52KΩ	68Ω
3	6BF6	160KΩ	680Ω	0Ω	.1Ω	120KΩ	1 Meg.	190KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3.- Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - No signal applied for voltage measurements.

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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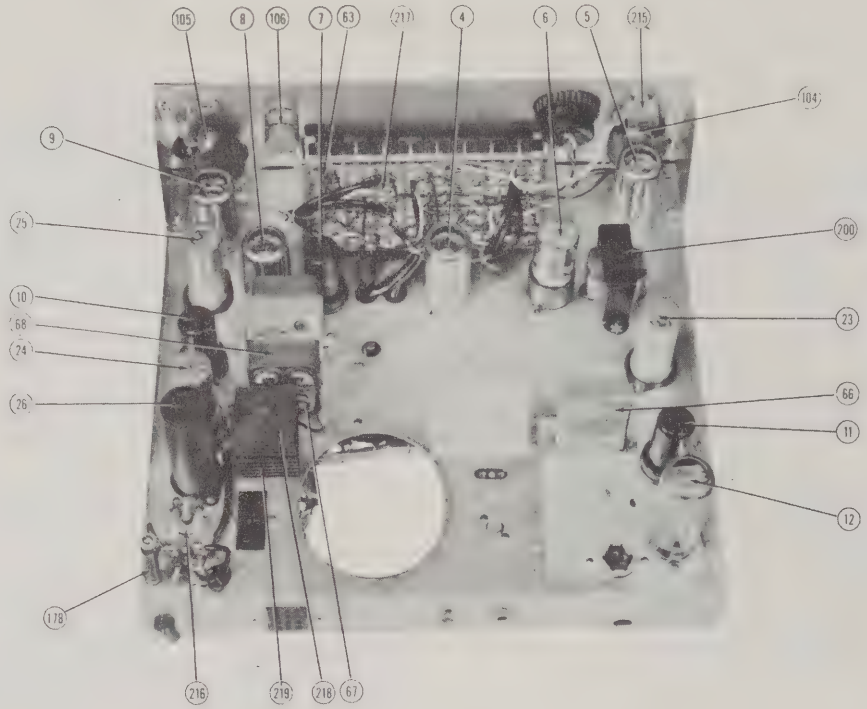
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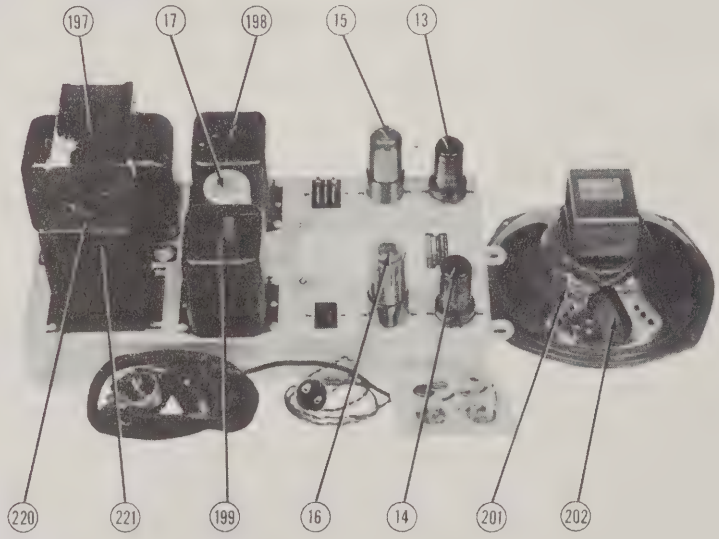
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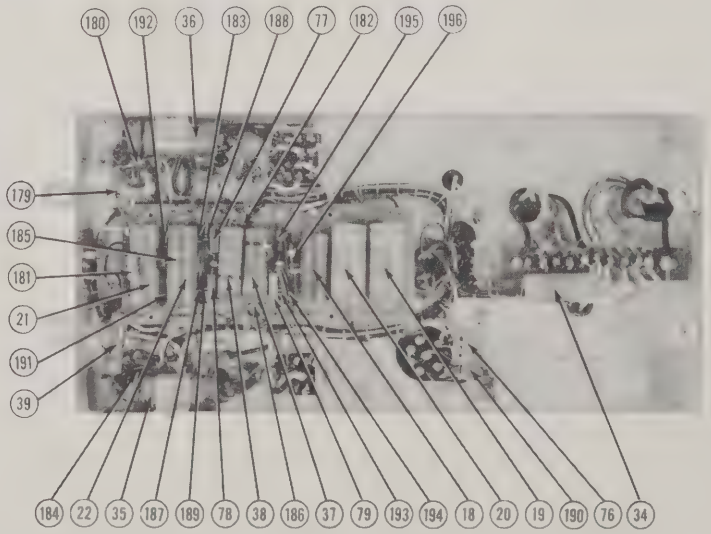
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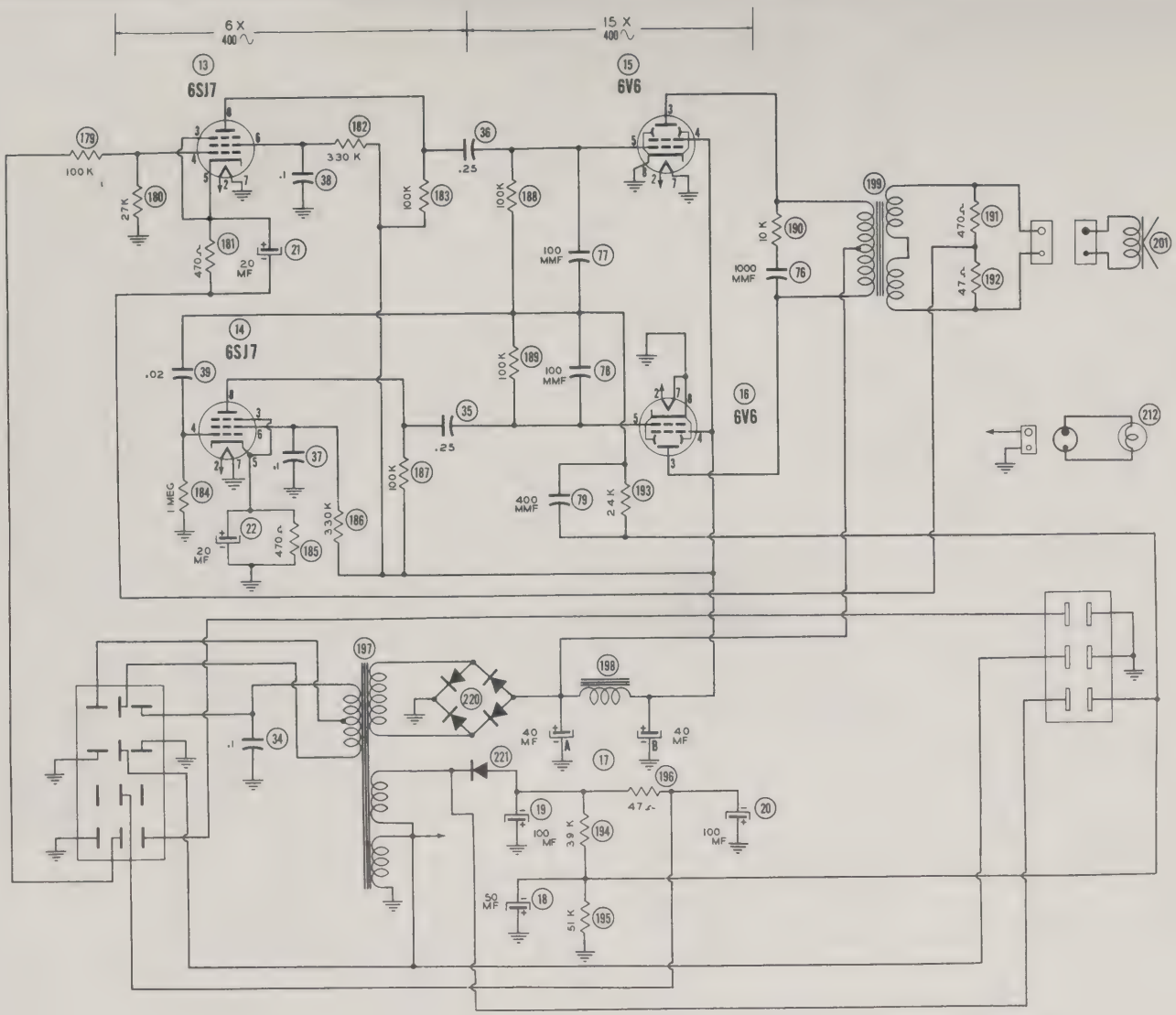

Pin No.	6SJ7 Volt.	6SJ7 Res.	6SJ7 Volt.	6SJ7 Res.
1	0V.	0Ω	0V.	0Ω
2	6.7VAC	.1Ω	6.7VAC	.1Ω
3	1.4VDC	470Ω	1.4VDC	470Ω
4	0V.	27KΩ	0V.	1 Meg.
5	1.4VDC	470Ω	1.4VDC	470Ω
6	65VDC	370KΩ	65VDC	370KΩ
7	0V.	0Ω	0V.	0Ω
8	40VDC	140KΩ	40VDC	140KΩ

Pin No.	6V6GT Volt.	6V6GT Res.	6V6GT Volt.	6V6GT Res.
1	0V.	0Ω	0V.	0Ω
2	6.7VAC	.1Ω	6.7VAC	.1Ω
3	290VDC	40KΩ	290VDC	40KΩ
4	280VDC	40KΩ	280VDC	40KΩ
5	-21VDC	175KΩ	-21VDC	175KΩ
6	0V.	INF.	0V.	INF.
7	0V.	0Ω	0V.	0Ω
8	0V.	0Ω	0V.	0Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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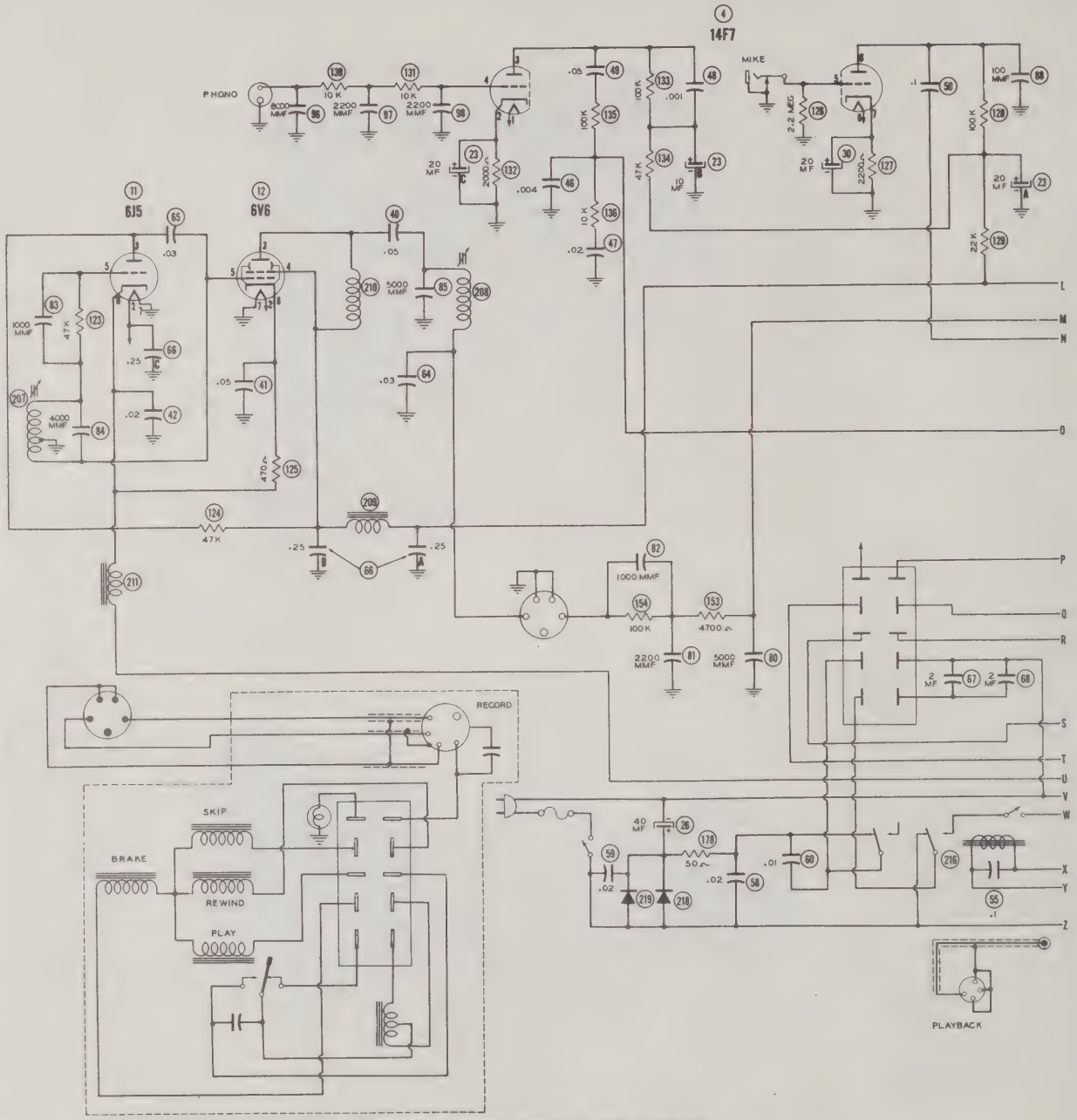
LEAR DYNAPORT
MODEL WC-311-D



VOLTAGE AND RESISTANCE READINGS TAKEN IN RECORD MIKE POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14F7	-28VDC	1.4VDC	115VDC	0V.	0V.	150VDC	1.6VDC	-19VDC
2	7F7	0V.	1.4VDC	160VDC	6V.	0V.	140VDC	1.6VDC	6.7VAC
3	6V6GT	0V.	6.7VAC	270VDC	240VDC	.3VDC	0V.	0V.	24VDC
4	12SJ7	0V.	-9VDC	.7VDC	0V.	.7VDC	150VDC	0V.	41VDC
5	14F7	-13VDC	1.5VDC	145VDC	0V	.8VDC	280VDC	50VDC	-9VDC
6	14F7	-28VDC	1.2VDC	155VDC	0V.	0V.	155VDC	1.2VDC	-37VDC
7	6J5	0V.	6.7VAC	280VDC	0V.	-17VDC	280VDC	0V.	0V.
8	6J5	0V.	6.7VAC	90VDC	0V.	-21VDC§	0V.	0V.	.4VDC
9	6V6GT	0V.	6.7VAC	270VDC	250VDC	0V.	0V.	0V.	20VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14F7	3Ω	1KΩ	200KΩ	INF.	2.1 Meg.	150KΩ	2.2KΩ	.25Ω
2	7F7	0Ω	3.3KΩ	300KΩ	150KΩ	2 Meg.	150KΩ	2.2KΩ	.1Ω
3	6V6GT	0Ω	.1Ω	40KΩ	40KΩ	1 Meg.	INF.	0Ω	1.1KΩ
4	12SJ7	0Ω	1Ω	1KΩ	1KΩ	1KΩ	1.1 Meg.	0Ω	300KΩ
5	14F7	2Ω	2.2KΩ	200KΩ	270KΩ	1 Meg.	40KΩ	50KΩ	1Ω
6	14F7	4Ω	2.2KΩ	200KΩ	500KΩ	500KΩ	200KΩ	2.2KΩ	5Ω
7	6J5	0Ω	.1Ω	60KΩ	INF.	1.2 Meg.	50KΩ	0Ω	0Ω
8	6J5	0Ω	.1Ω	90KΩ	4Ω	47KΩ	0Ω	0Ω	50Ω
9	6V6GT	0Ω	.1Ω	4KΩ	40KΩ	4Ω	INF.	0Ω	470Ω

TUBES #1, 4, 5 and 6 THE FILAMENTS ARE IN SERIES.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

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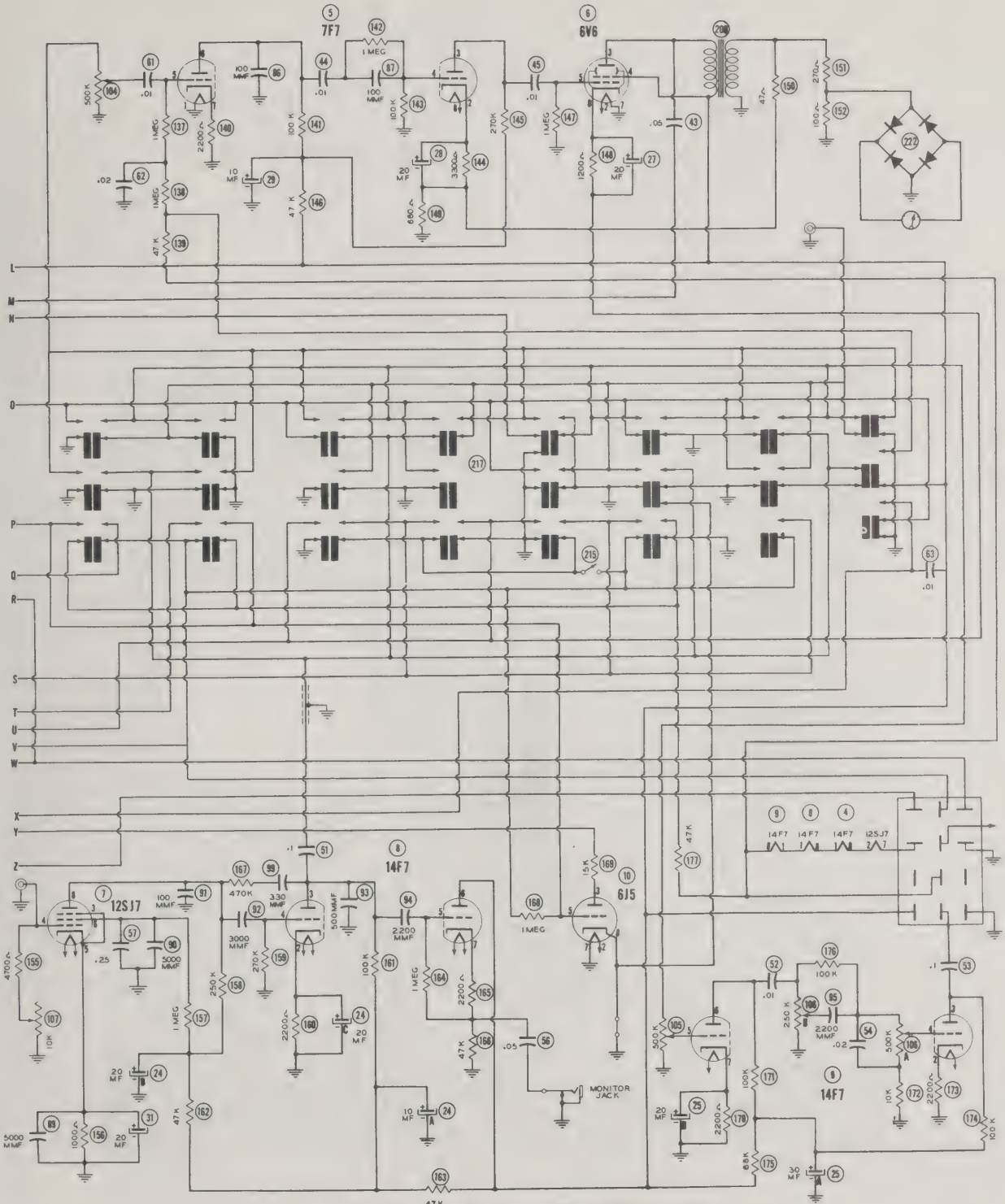

STAGE GAIN MEASUREMENTS		
PHONO AMP.	50X	400 Ω
MIC AMP.	35X	400 Ω
AUDIO	15X	400 Ω
AUDIO	45X	400 Ω
OUTPUT	30X	400 Ω
AUDIO	60X	400 Ω
AUDIO	35X	400 Ω
AUDIO	1X	400 Ω
TREBLE AMP.	25X	400 Ω
BASS AMP.	10X	400 Ω

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PARTS LIST

Ref. No.	Part No.	DESCRIPTION
		MECHANICAL
1	42172	Pickup arm
2	40670	Cartridge
3	10525	Cartridge mounting screws
4	33205-24	Pickup arm balance spring
5	42006	Spindle
6	42004	Turntable
7	42124	Turntable assembly (Including items 5 and 6)
8	42013	Spool holder nut
9	42014	Spool holder
10	42172	Pickup arm bracket
11	33205-21	Forward drive pulley tension spring
12	42117	Adjustment screw for item (11)
13	29567	Flat washer
14	42177	Hex nut
15	59006	Phillips hd. machine screw No. 8—32 x 7/16
16	56212	Inner tooth lock nut
17	42133	Cue meter assembly
18	42031	Cut meter name plate disc
19	27713-39	Shim washers
20	10451	Drive adjustment screw
21	29567	Fiber washer
22	29614-85	Bronze bushing
23	40451	Play-back head
24	40439	Record head
25	42144	Rewind spool hub assembly
26	27713-37	Washer
27	29567-45	Washer
28	27713-37	Washer
29	29614-84	Bronze bushing
30	42443	Guide pin
31	42002	Baseplate
32	42102	Forward pulley solenoid assembly
33	42480-02	Solenoid coil
34	42245	Fiber washer
35	42296	Coil spring
36	29567	Fiber washer
37	AN365-632	Hex nut
38	42480-01	Solenoid brake release
39	42162	Plunger
40	42162	Plunger
41	42030	Plunger bracket
42	42070	Forward drive pulley bracket
43	29828-15	Wheel pin
44	42066	Forward pulley
45	42011-04	"C" washer
46	42128	Pulley mounting bracket
47	42146	Forward drive pulley assembly
48	42067	Shaft
49	42106	Skip pulley assembly
50	29828-15	Dowel pin
51	42011-12	"C" washer
52	29567-50	Washer
53	32205-18	Spring
54	42103	Solenoid—skip
55	42380	Bronze gear—cue meter
56	29567-50	Flat washer
57	42011	"C" washer
58	70535	Cue meter light
59	42169	Light bracket
61	42136	Brake release link
62	33205-14	Arm spring
63	40108	Brake release lever
64	42128	Rewind drive pulley
65	33205-17	Rewind brake shoe spring
66		Spring
67	42110	Turntable brake shoe
68	42149	Brake arm assembly
69	42131	Idler rewind pulley assembly
70	42018	Rewind solenoid bracket
71	33205-15	Spring
72	42103	Rewind solenoid
73	33205-13	Brake arm tension spring—turntable
74	33205-12	Brake arm tension spring—rewind spool
75	42148	Rewind brake arm
76	42011-04	"C" washer
77	29567-44	Flat washer
78	33205-17	Idler and drive pulley tension spring
79	36648	Motor drive pulley and fan
80	36652	Motor
81	AN365-1024	Motor mounting nut
82	31656-12	Level wind tension spring
83	61889	Record head socket
84	42116	Spacer
85	42109	Cover
86	56195	Internal tooth lock nut
87	10541	Screw
88	42022	Adjusting screw
89	61323	Record head socket
90	42011-11	Speed nut
91	29567	Flat washer
92	42221	Level-wind cam
93	42285	Fiber gear
94	42042	Shaft
95	AN365-24	Hex nut
96	42034	Speed nut
97	42145	Cue meter bracket assembly (Including items 90, 91, 92, 93, 94 and 96)
98	AN365-1024	Hex nut
99	960-10	Flat washer
100	31656	Spring
101	42099	Level-wind bracket
102	960-10	Flat washer
		ELECTRICAL
1		Tube, 6BE6 converter
2		Tube, 6BA6 IF amp.
3		Tube, 6BF6 Det.-AVC-AF
4		Tube, 14F7 phono-mic. amp.
5		Tube, 7F7 recorder amp.
6		Tube, 6V6GT power amp.
7		Tube, 12SJ7 playback pre-amp.
8		Tube, 14F7 AF amp.
9		Tube, 14F7 tone amp.
10		Tube, 6J5 motor control
11		Tube, 6J5 bias oscillator
12		Tube, 6V6GT bias osc. amp.
13		Tube, 6SJ7 AF amplifier
14		Tube, 6SJ7 phase inverter
15		Tube, 6V6GT power output
16		Tube, 6V6GT power output
17A	42005-05	Capacitor, filter — 40 mfd. @ 450 volts
B		Capacitor, filter — 40 mfd. @ 450 volts
18	62132	Capacitor, bias filter — 50 mfd. @ 25 volts
19	62133	Capacitor, bias filter — 100 mfd. @ 50 volts
20	62133	Capacitor, DC filament filter — 100 mfd. @ 50 volts
21	60003	Capacitor, cathode bypass — 20 mfd. @ 25 volts
22	60003	Capacitor, cathode bypass — 20 mfd. @ 25 volts
23A	53939	Capacitor, decoupling — 20 mfd. @ 350 volts
B		Capacitor, decoupling — 10 mfd. @ 350 volts
C		Capacitor, cathode bypass — 20 mfd. @ 25 volts
24A	53939	Capacitor, decoupling — 10 mfd. @ 350 volts
B		Capacitor, decoupling — 20 mfd. @ 350 volts
C		Capacitor, cathode bypass — 20 mfd. @ 25 volts
25A	53939	Capacitor, decoupling — 30 mfd. @ 350 volts
B		Capacitor, cathode bypass — 25 mfd. @ 25 volts
26		Capacitor, filter — 40 mfd. @ 450 volts
27	60003	Capacitor, cathode bypass — 20 mfd. @ 25 volts
28	60003	Capacitor, cathode bypass — 20 mfd. @ 25 volts
29	54146	Capacitor, decoupling — 10 mfd. @ 350 volts
30	60003	Capacitor, cathode bypass — 20 mfd. @ 25 volts
31	60003	Capacitor, cathode bypass — 20 mfd. @ 25 volts
32	42205-01	Capacitor, AF plate decoupling — 15 mfd. @ 300 volts
33	42289-01	Capacitor, bias filter — 50 mfd. @ 25 volts
34	56631	Capacitor, line filter — .1 mfd. @ 400 volts
35	56662	Capacitor, audio coupling — .25 mfd. @ 600 volts
36	56662	Capacitor, audio coupling — .25 mfd. @ 600 volts
37	56631	Capacitor, screen bypass — .1 mfd. @ 400 volts
38	56631	Capacitor, screen bypass — .1 mfd. @ 400 volts
39	2178	Capacitor, audio coupling — .02 mfd. @ 600 volts
40	56656	Capacitor, erase coil coupling — .05 mfd. @ 600 volts
41	56600	Capacitor, cathode bypass — .05 mfd. @ 200 volts
42	56624	Capacitor, cathode bypass — .02 mfd. @ 600 volts
43	56656	Capacitor, audio coupling — .05 mfd. @ 600 volts
44	56650	Capacitor, audio coupling — .01 mfd. @ 600 volts
45	56656	Capacitor, audio coupling — .01 mfd. @ 600 volts
46	56589	Capacitor, tone compensation — .004 mfd. @ 200 volts
47	56530	Capacitor, tone compensation — .02 mfd. @ 200 volts
48	56583	Capacitor, tone compensation — .001 mfd. @ 600 volts
49	56656	Capacitor, audio coupling — .05 mfd. @ 600 volts
50	56652	Capacitor, audio coupling — .1 mfd. @ 400 volts
51	56659	Capacitor, audio coupling — .1 mfd. @ 600 volts
52	56650	Capacitor, audio coupling — .01 mfd. @ 600 volts
53	56659	Capacitor, audio coupling — .1 mfd. @ 600 volts
54	56624	Capacitor, tone compensation — .02 mfd. @ 600 volts
55	56659	Capacitor, relay bypass — .1 mfd. @ 600 volts
56	56656	Capacitor, audio coupling — .05 mfd. @ 600 volts
57	56634	Capacitor, screen bypass — .25 mfd. @ 400 volts
58	56624	Capacitor, RF bypass power supply — .02 mfd. @ 600 volts
59	56624	Capacitor, rectifier bypass — .02 mfd. @ 600 volts
60		Capacitor, RF bypass — .01 mfd. @ 1600 volts

PARTS LIST—*continued*

Ref. No.	*Part No.*	DESCRIPTION	
61	56684	Capacitor, audio coupling	.01 mfd. @ 200 volts
62		Capacitor, tone compensation	.02 mfd. @ 200 volts
63	56650	Capacitor, hash filter	.01 mfd. @ 600 volts
64		Capacitor, fixed trimmer	.03 mfd. @ 600 volts
65	56626	Capacitor, bias oscillator coupling	.03 mfd. @ 400 volts
66A		Capacitor, RF bypass power supply	.25 m.d @ 600 volts
B		Capacitor, bias osc. plate decoup.	.25 mfd @ 600 volts
C		Capacitor, filament bypass	.25 mfd @ 600 volts
67	61951	Capacitor, motor bypass	2 mfd. @ 330 VAC
68	61951	Capacitor, motor bypass	2 mfd @ 330 VAC
69	56631	Capacitor, audio coupling	.1 mfd. @ 400 volts
70	56628	Capacitor, audio coupling	.05 mfd. @ 400 volts
71	56631	Capacitor, decoupling	.1 mfd. @ 400 volts
72	56631	Capacitor, RF bypass	.1 mfd. @ 400 volts
73	56628	Capacitor, AVC filter	.05 mfd. @ 400 volts
74	56628	Capacitor, screen decoupling	.05 mfd. @ 400 volts
75	56628	Capacitor, IF cathode bypass	.05 mfd. @ 400 volts
76	62021	Capacitor, tone compensation	1000 mmf. @ 500 volts
77	62019	Capacitor, output grid bypass	100 mmf. @ 500 volts
78	62019	Capacitor, output grid bypass	100 mmf. @ 500 volts
79	62131	Capacitor, RF bypass	400 mmf. @ 500 volts
80	2179	Capacitor, tone compensation	5000 mmf. @ 500 volts
81	2178	Capacitor, tone compensation	2200 mmf. @ 500 volts
82		Capacitor, tone compensation	1000 mmf. @ 500 volts
83		Capacitor, osc. grid cap	1000 mmf. @ 500 volts
84		Capacitor, fixed trimmer	4000 mmf. @ 500 volts
85		Capacitor, fixed trimmer	5000 mmf. @ 500 volts
86	56041	Capacitor, plate bypass	100 mmf. @ 500 volts
87	62019	Capacitor, tone compensation	100 mmf. @ 500 volts
88	56041	Capacitor, mic. amp. plate bypass	100 mmf. @ 500 volts
89		Capacitor, cathode bypass	5000 mmf. @ 300 volts
90		Capacitor, screen bypass	5000 mmf. @ 300 volts
91	56041	Capacitor, plate bypass	100 mmf. @ 500 volts
92	62135	Capacitor, audio coupling	3000 mmf. @ 500 volts
93		Capacitor, plate bypass	500 mmf. @ 500 volts
94	2178	Capacitor, audio coupling	2200 mmf. @ 500 volts
95	2178	Capacitor, tone compensation	2200 mmf. @ 500 volts
96		Capacitor, tone compensation	6000 mmf. @ 500 volts
97		Capacitor, tone compensation	2200 mmf. @ 500 volts
98		Capacitor, tone compensation	2200 mmf. @ 500 volts
99	62134	Capacitor, feedback	330 mmf. @ 500 volts
100	56057	Capacitor, IF coupling	100 mmf. @ 500 volts
101	56061	Capacitor, diode RF filter	470 mmf. @ 500 volts
102	56057	Capacitor, diode RF filter	100 mmf. @ 500 volts
103	56055	Capacitor, osc. grid. cap.	47 mmf. @ 500 volts
104		Record volume control	500 K with switch
105		Listen volume control	500 K with switch
106A	40912	Bass tone control (front section)	
B		Treble tone control (rear section)	
107	55357	Volume level control	
108	55479	Resistor, oscillator grid	22K, ½ watt
109	57702	Resistor, screen dropping	10K, 2 watts
110	55464	Resistor, IF cathode	68 ohms, ½ watt
111	55489	Resistor, AVC network	1 meg., ½ watt
112	55489	Resistor, AVC network	1 meg., ½ watt
113	55483	Resistor, diode filter	100K ohms, ½ watt
114	55478	Resistor, diode load	15K ohms, ½ watt
115	55470	Resistor, AF cathode	680 ohms, ½ watt
116	55483	Resistor, AF grid	100K ohms, ½ watt
117	55483	Resistor, bias network	100K ohms, ½ watt
118	55479	Resistor, tone compensation	22K ohms, ½ watt
119	55479	Resistor, AF plate load	22K ohms, ½ watt
120	55483	Resistor, AF plate decoupling	100K ohms, ½ watt
121	55436	Resistor, bias	270K ohms, ½ watt
122	57635	Resistor, decoupling	1800 ohms, 2 watts
123	55481	Resistor, bias osc. grid	47K ohms, ½ watt
124	55481	Resistor, bias osc. plate load	47K ohms, ½ watt
125	56001	Resistor, bias osc. amp. cathode	470 ohms, 2 watts
126	55447	Resistor, mic. pre-amp. grid	2.2 meg., ½ watt
127	55411	Resistor, mic. pre-amp. cathode	2200 ohms, ½ watt
128	55431	Resistor, mic. pre-amp. plate load	100K ohms, ½ watt
129	55423	Resistor, decoupling	22K ohms, ½ watt
130	55419	Resistor, tone compensation	10K ohms, ½ watt
131	55419	Resistor, tone compensation	10K ohms, ½ watt
132		Resistor, phono. amp. cathode	2000 ohms, ½ watt
133	55431	Resistor, phono. amp. plate load	100K ohms, ½ watt
134	55427	Resistor, phono. amp. plate decoupling	47K ohms, ½ watt
135	55327	Resistor, tone compensation	100K ohms, ½ watt
136	55303	Resistor, tone compensation	10K ohms, ½ watt
137	55443	Resistor, 1st recording amp. grid	1 meg., ½ watt
138	55443	Resistor, 1st recording amp. grid	1 meg., ½ watt
139	55427	Resistor, bias net	47K ohms, ½ watt
140	55411	Resistor, 1st recording amp. cathode	2200 ohms, ½ watt
141	55431	Resistor, 1st recording amp. plate load	100K ohms, ½ watt
142	55351	Resistor, tone compensation	1 meg., ½ watt
143	55327	Resistor, 2nd recorder amp. grid	100K ohms, ½ watt
144	55413	Resistor, 2nd recorder amp. cathode	3300 ohms, ½ watt
145	55436	Resistor, 2nd recorder amp. plate load	270K ohms, ½ watt
146	55427	Resistor, decoupling	47K ohms, ½ watt
147	55443	Resistor, recorder amp. output grid	1 meg., ½ watt
148	55408	Resistor, recorder amp. output cathode	1200 ohms, ½ watt
149	55275	Resistor, feedback	680 ohms, ½ watt
150	55247	Resistor, feedback	47 ohms, ½ watt
151	55265	Resistor, rec. level indicator net	270 ohms, ½ watt
152	55261	Resistor, rec. level indicator net	100 ohms, ½ watt
153	55415	Resistor, tone compensation	4700 ohms, ½ watt
154	55327	Resistor, tone compensation	100K ohms, ½ watt
155	55415	Resistor, 1st playback pre-amp. grid	4700 ohms, ½ watt
156	55407	Resistor, 1st playback pre-amp cathode	1000 ohms, ½ watt
157	55443	Resistor, 1st playback pre-amp. screen	1 meg., ½ watt
158		Resistor, 1st playback pre-amp. plate load	250K ohms, ½ watt
159	55436	Resistor, 2nd playback pre-amp grid	270K ohms, ½ watt
160	55411	Resistor, 2nd playback pre-amp. cathode	2200 ohms, ½ watt
161	55431	Resistor, 2nd playback pre-amp. Plate load	100K ohms, ½ watt
162	55427	Resistor, 1st playback pre-amp. decoupling	47K ohms, ½ watt
163	55427	Resistor, decoupling	47K ohms, ½ watt
164	55443	Resistor, monitor grid	1 meg., ½ watt
165	55411	Resistor, monitor cathode	2200 ohms, ½ watt
166	55427	Resistor, monitor cathode	47 K ohms, ½ watt
167	55343	Resistor, feedback	470K ohms, ½ watt
168	55443	Resistor, motor control grid	1 meg., ½ watt
169	55953	Resistor, voltage dropping	15K ohms, ½ watt
170	55411	Resistor, treble tone amp. cathode	2200 ohms, ½ watt
171	55431	Resistor, treble tone amp. plate load	100K ohms, ½ watt
172	55419	Resistor, bass tone amp. grid	10K ohms, ½ watt
173	55411	Resistor, bass tone amp. cathode	2200 ohms, ½ watt
174	55431	Resistor, bass tone amp. plate load	100K ohms, ½ watt
175	55429	Resistor, decoupling	68K ohms, ½ watt
176	55431	Resistor, tone comepnsation	100K ohms, ½ watt
177	55427	Resistor, bias	47K ohms, ½ watt
178		Resistor, surge limiter	50 ohms, 10 watts
179	55431	Resistor, Isolation	100K ohms, ½ watt
180	55424	Resistor, AF grid	27K ohms, ½ watt
181	55403	Resistor, AF cathode	470 ohms, ½ watt
182	55437	Resistor, AF screen	330K ohms, ½ watt
183	55327	Resistor, AF plate load	100K ohms, ½ watt
184	55443	Resistor, phase inverter grid	1 meg., ½ watt
185	55408	Resistor, phase inverter cathode	470 ohms, ½ watt
186	55437	Resistor, phase inverter screen	330K ohms, ½ watt
187	55327	Resistor, phase inverter plate load	100K ohms, ½ watt
188	55327	Resistor, output grid	100K ohms, ½ watt
189	55327	Resistor, output grid	100K ohms, ½ watt
190	55569	Resistor, tone compensation	10K ohms, ½ watt
191	55271	Resistor, feedback	470 ohms, ½ watt
192	55247	Resistor, feedback	47 ohms, ½ watt
193	55312	Resistor, bias network	24K ohms, ½ watt
194	55317	Resistor, bias network	39K ohms, ½ watt
195	55320	Resistor, bias network	51K ohms, ½ watt
196	55923	Resistor, filament dropping	47 ohms, ½ watt
197	61907-3	Power transformer	
198	61906	Filter choke	
199	61909-2	Output transformer	
200		Output transformer	
201		8" P.M. speaker	
202		Cone (7.3 ohms voice coil)	
203	40943	Loop antenna	
204	40947	Oscillator coil	
205	40830-01	Input IF transformer	
206	40830-02	Output IF transformer	
207	40846	Bias oscillator coil	
208	43009	Bias oscillator output coil	
209	40848	RF choke	
210	40848	RF choke	
211	40848	RF choke	
212		Type No. 47 dial light	
213		Type No. 40 dial light	
214		Type No. 40 dial light	
215		Key switch	
216		Relay (D.P.D.T.)	
217		Pushbutton switch	
218	62094	Selenium rectifier (200MA)	
219	61191	Selenium rectifier (100MA)	
220	61191	Selenium rectifier (100MA) (4 used in assembly)	
221	62094	Selenium rectifier (200MA)	
222		Bridge meter rectifier	
223	42245	2 gang variable capacitor	

TOP VIEW

MOTOROLA
MODEL RC-30

MOTOROLA
MODEL RC-30

GENERAL INFORMATION

The record changer RC-30 is an automatic, solenoid trip, single post changer, designed to play automatically ten 10-inch records or eight 12-inch records, not intermixed. The last record will be repeated until the changer is turned off.

The "motor" and "reject" switches required to operate this changer are part of the radio receiver.

Manufactured by

MOTOROLA, INC.—4545 W. Augusta Blvd., Chicago 51, Illinois

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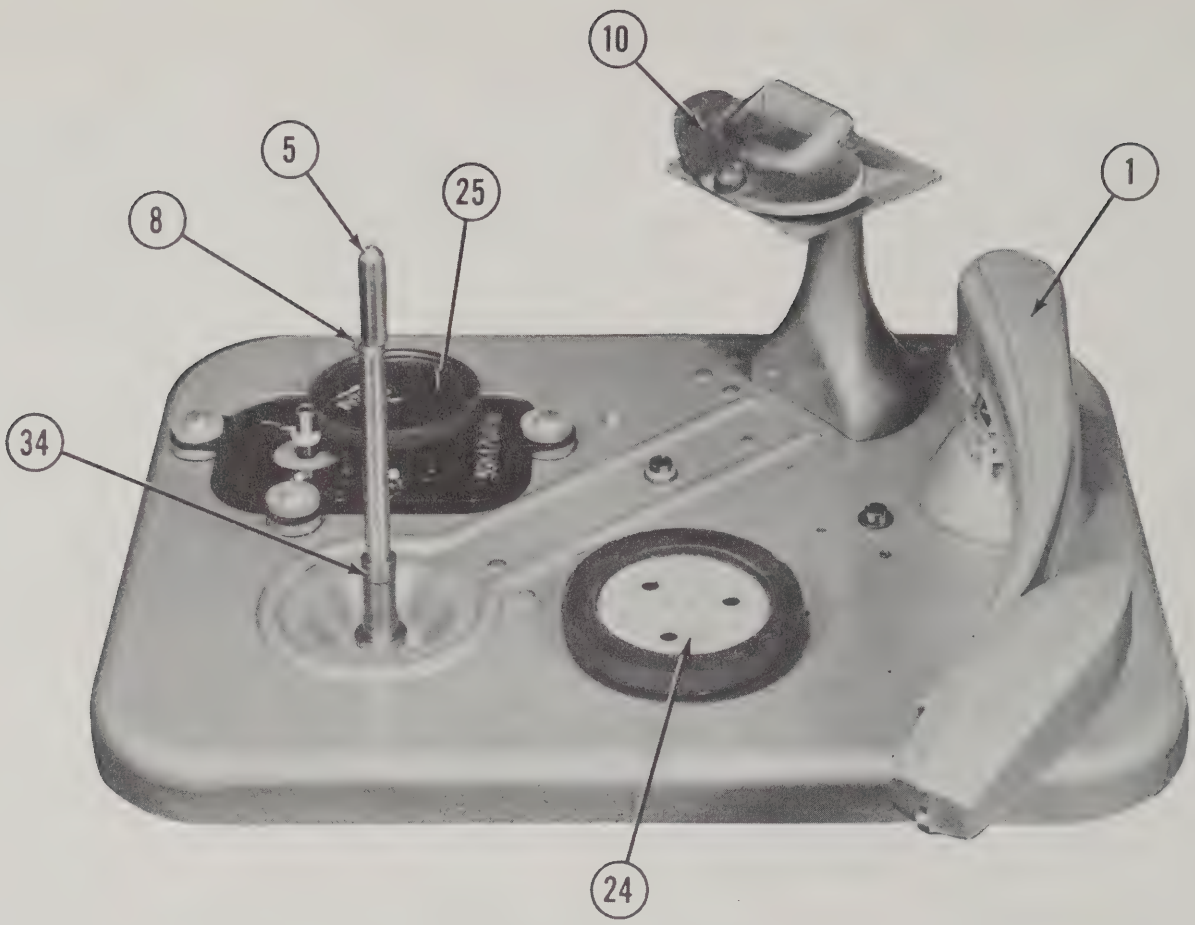
DATE 12/49 SET #80 FOLDER #9



TOP VIEW LESS TURNTABLE

LOADING

1. To set for correct record size, rotate the record support plate (in either direction), so that the desired number, which is stamped on the support plate, faces the spindle.

2. Place the record clamp in a position pointing away from the turntable.

3. Rotate the record post cap (5) (clockwise) 180° until it snaps into a position which is out of line with record post (34).

4. Place a stack of records on the record spindle so they will rest on the record support plate (10) and the eccentric of the eccentric and tube assembly (8).

5. Place the record clamp so that it will rest on top of the records. The changer is now ready to play, automatically, the entire stack of records.

UNLOADING

1. After the last record has been played, allow the changer to go through its complete change cycle, returning the pickup arm to the record. As soon as this occurs, lift the pickup arm off the record and place it on the arm rest (36).

2. Turn the spindle cap (5) so that it will align with the record post (34).

3. Pivot the record clamp backward and remove the records.

CHANGE CYCLE

As the pickup arm moves to within 1⅞" of the record post, the trip screw (59) of the trip arm (57B) is moved against the trip lever (41). This actuates the trip lever which, in turn, closes the trip switch (43). Closing of the trip switch energizes the solenoid coil (45), causing the core (44) to pull in; and through the actuation of the bell crank (52), the drive arm (68) is moved a definite amount, bringing the drive pulley (24) in contact with the turntable rim, which, in turn, rotates the cam wheel through the idler gear (73), thereby starting the change cycle.

As the cam wheel (63) turns, the roller of the bell crank lever (52) follows the rim of the cam wheel (63) and, as a result, causes the drive arm to hold the drive pulley (24) firmly against the turntable rim.

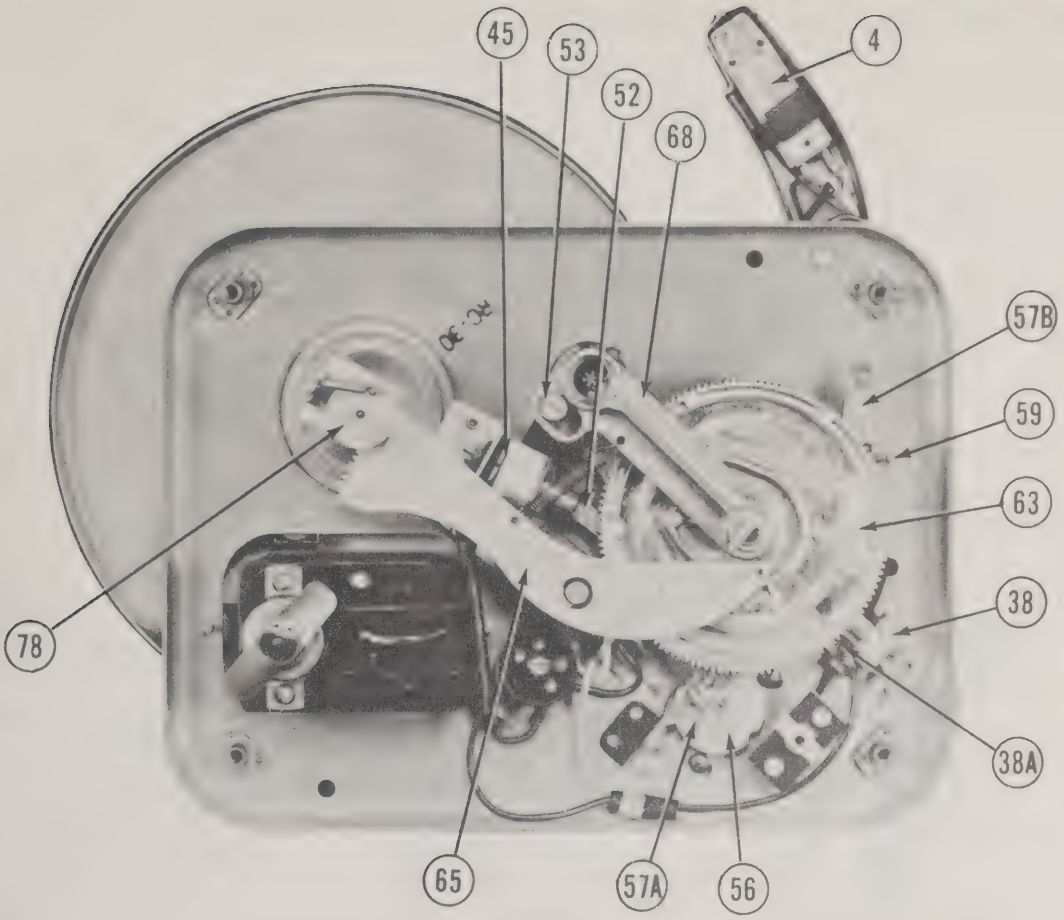
Immediately after the cam wheel starts to rotate, the bottom leaf of the safety switch (38) rides up the inclined portion of the cam surface (63A), cutting off current to the solenoid coil.

The lift rod (11) now rides up the incline of cam surface (63A), raising the pickup arm off the record.

The stud of the selector lever (57A), which is following the groove (63B) of the cam wheel, actuates the trip arm (57B), and, as a result, swings the pickup arm out to clear the records.

The roller of the gear arm (65), riding in the groove located on the bottom of the cam wheel, actuates the gear arm causing the gear arm to rotate the spindle gear (49), and, in turn, the eccentric (8). When the eccentric is in line with the spindle cap (5), it allows a record to drop over the eccentric. When the eccentric is rotated back, it carries the record with it, thereby allowing the record to drop to the turntable when the eccentric aligns with record post (34).

As the cam wheel continues to rotate, the stud of the selector lever (57A), riding in the groove (63B) of the cam wheel, moves the pickup arm in positioning it for set-down. The set-down point of the pickup arm is determined by the position of the record support plate (10). The selector shaft and plate assembly (56), which rotates with the record support plate, moves the selector lever (57A). This action changes the angle between the trip arm (57B) and the



BOTTOM VIEW

selector lever (57A), which, in turn, positions the pickup arm for proper set-down.

The pickup lift rod (11) now rides down the incline portion of cam track (63A), lowering the pickup arm (1) to the record.

The roller of the bell crank lever (52), which is riding around the rim of the cam wheel, is now pulled into the detent of the rim by the tension spring (74). This action causes the bell crank to move the drive arm (68), which, in turn, disengages the drive pulley (24) from the turntable rim, completing the change cycle. Flange (37A) serves as a brake to the drive pulley (24), when it is disengaged from the turntable, to prevent recycling.

ADJUSTMENTS

Drive Pulley Adjustment

This adjustment must be made very carefully to assure proper cycling. Too loose an adjustment may cause uneven cycling or no cycling at all. Too tight an adjustment will cause slow cycling and undue motor wear.

Correct adjustment may be made as follows:

1. Set the changer in cycle and stop the turntable when the pickup arm comes back to almost the set-down position.

2. Loosen the eccentric stud (53), so that the drive pulley (24) is moved away from the turntable.

3. Using a screwdriver, turn the eccentric stud until the pickup arm starts to move when rotating the turntable clockwise by hand. Do not hold screwdriver on eccentric stud while checking the adjustment.

4. If the pickup arm moves down when the turntable is rotated clockwise, but not up with a counterclockwise rotation, the critical position of the adjustment has been reached.

5. Tighten the eccentric stud just far enough so that the pickup arm will raise when rotating the turntable counterclockwise. This completes the adjustment.

Record Support Platform Adjustment

1. Turn the spindle cap (5) so that it is in line with the record post (34).

2. Turn the record support plate (10) to the 10-inch position, making sure it is snapped into position by the selector spring (42).

3. Place a standard 10-inch record on the spindle, holding it in line with the eccentric (8) and the support plate (10).

4. The edge of the record and the support plate should be equal distance at all points. This is to allow the records to drop evenly. To make the proper adjustment, loosen the two Allen set screws just under the support plate. Turn the support plate until adjustment is correct and tighten the set screws.

5. The distance between the record and the support plate should be just enough for the record to clear the edge of the plate. This distance can be varied by loosening the two screws (40) and sliding the record support post (23) forward or backward until the distance is correct.

6. Tighten the screws (40).

Set-Down Point

1. Turn record support to 12-inch position.

2. Place a standard 12-inch record on the turntable.

3. Start the changer, allowing it to go through a complete change cycle.

4. Observe the point where the needle contacts the record. This should be ⅛ inch in from the edge of the record.

A PHOTOFACT "EXPLODED" VIEW

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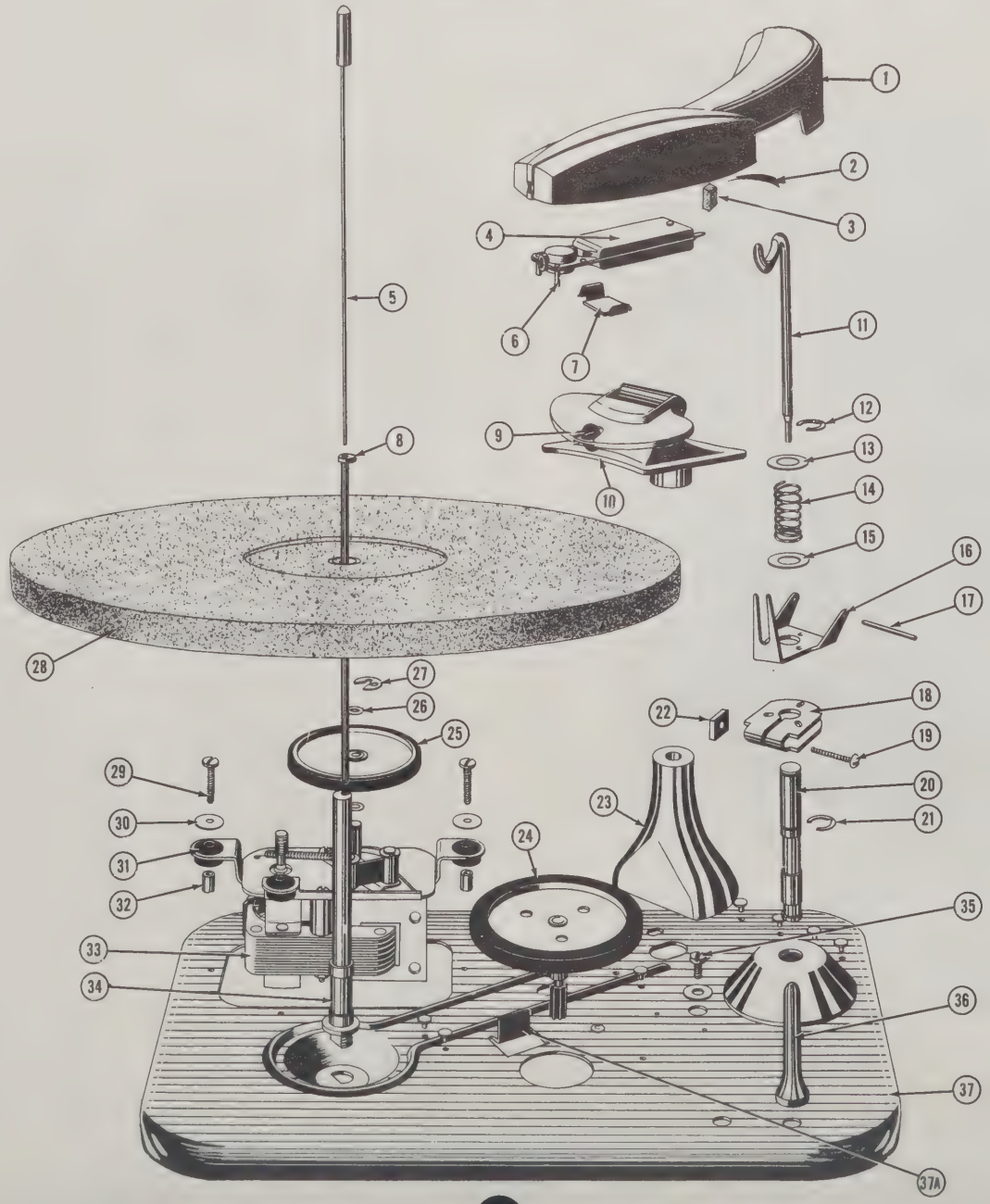

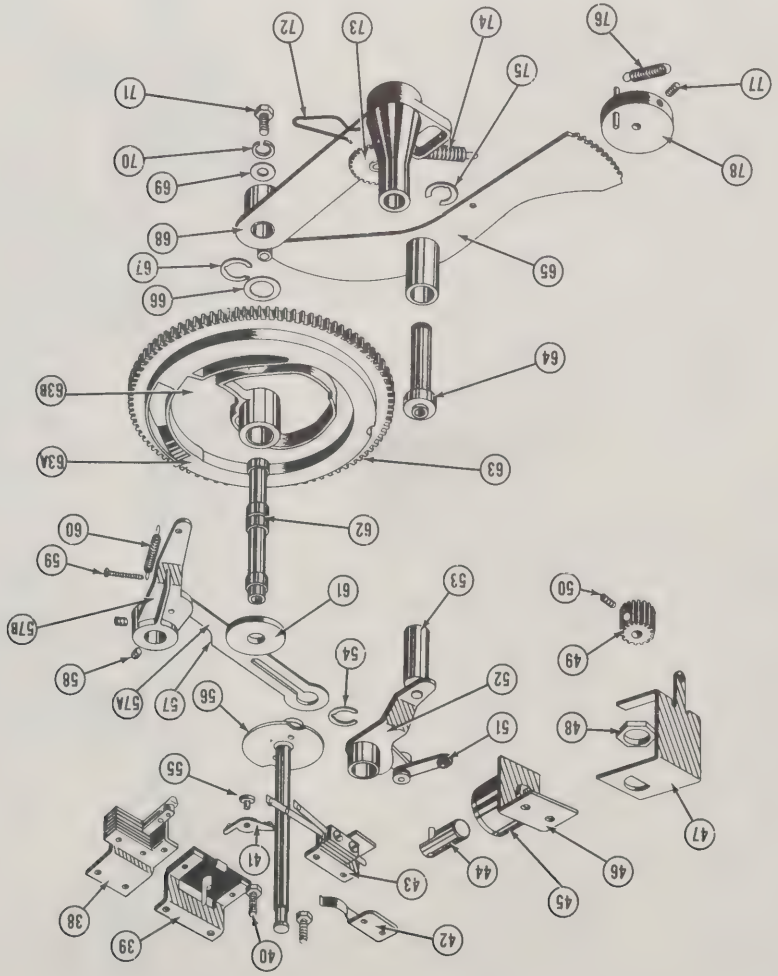
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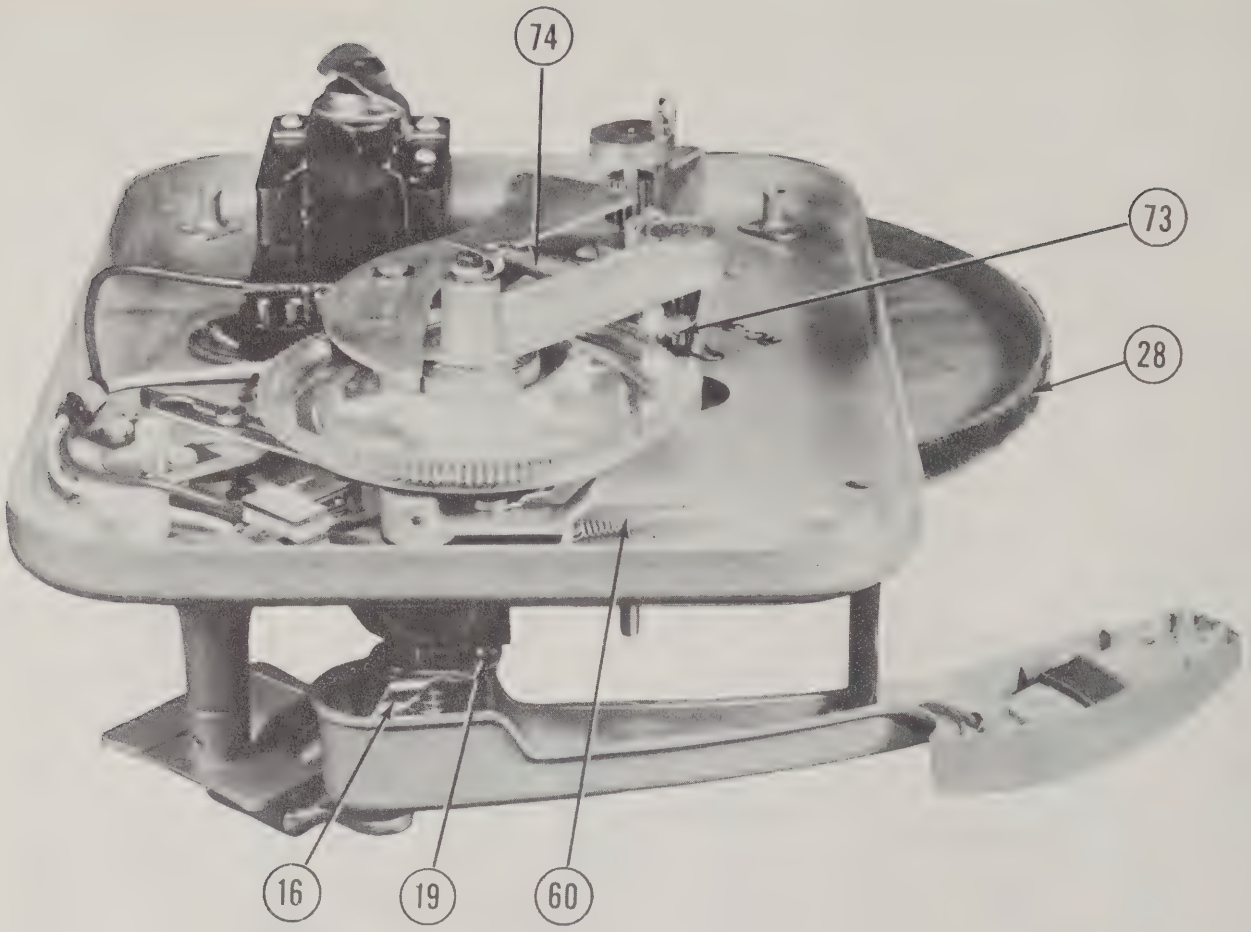


BOTTOM SIDE VIEW

5. If the arm is out of position, Place a stack of eight 12-inch records on the turntable, cycle the changer and stop it just before the needle touches the top record. As a result, the stud of the selector lever (57A) will still be in the groove of the cam wheel, preventing horizontal movement of the trip arm while the pickup arm adjustment is being made.

6. Loosen the clamp screw (19) and move the pickup arm until the needle is properly positioned.

7. Tighten the clamp screw and check the adjustment. This adjustment should also take care of the 10-inch set-down, although a minor compromise adjustment to take care of both can be made, if necessary.

Trip Adjustment

1. Draw a 3¾-inch diameter circle on a piece of paper, punch a ¼-inch hole in the exact center, and place on the turntable.

2. Turn the record support plate (10) to the 12-inch position.

3. Start the changer, allowing it to go through its change cycle; at the end of the change cycle, the pickup arm will be in a rest position along the side of the turntable. Do not turn off the changer.

4. Pick up the arm and move it slowly toward record post. Correctly adjusted, the changer should trip as the needle crosses the circle line. Correct adjustment may be obtained by turning the adjusting screw (59). Turning the screw counterclockwise delays the tripping, and clockwise advances the tripping.

Record Dropping Mechanism

At the end of the change cycle, the eccentric (8) should be in line with the record post (34). If they are not in line, readjust as follows:

1. Loosen the slab head set screw (50) in the spindle gear (49). The eccentric is now free to turn.

2. Align the eccentric to the record post.

3. Tighten the set screw. Do not tighten the set screw too tight because it might dent the eccentric tube and cause binding.

Pickup Arm Height

With the changer out of cycle, the needle of the pickup arm should be even with the top of the turntable. If the pickup arm height is not correct, the needle may not rest properly on the record, or may not clear a full stack of records, or the pickup arm may hit the bottom record on the support post:

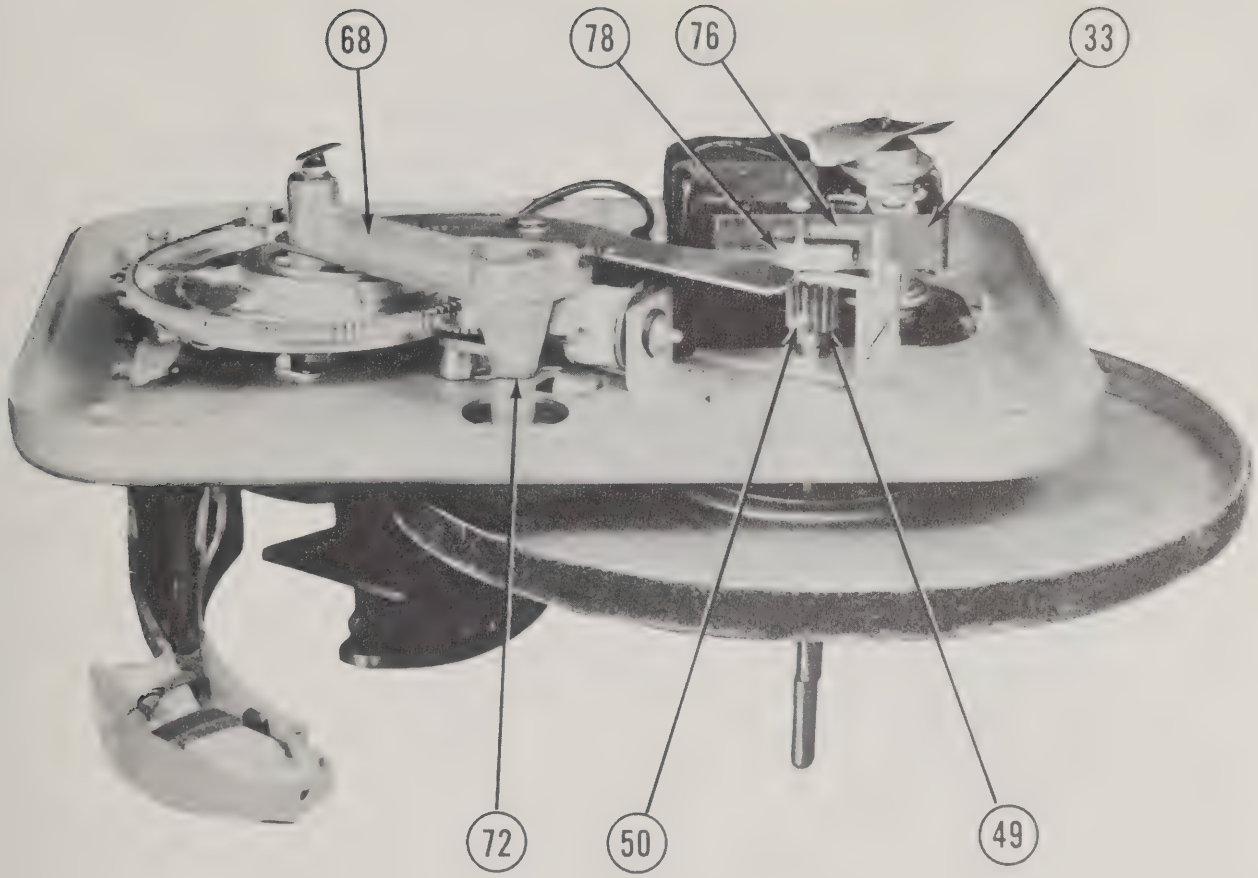
1. Raise the pickup arm straight up.

2. Using long-nose pliers, bend the pickup lift rod (11) (along its flat portion) in the direction required to bring the pickup arm into proper adjustment.

Safety Switch

The safety switch (38), which is wired in series with the solenoid coil (45), is actuated by the incline and straight of the cam surface (63A). Immediately after the change cycle starts, the bottom leaf of the safety switch rides up the incline of track (63A), causing the switch to open the solenoid current circuit. If the contacts are open when not in cycle, the change cycle may fail to start; or excessive "buzzing" will be heard if this switch stays closed too long at the start of the change cycle:

1. With the changer out of cycle, turn the switch adjustment screw (38A) clockwise until the safety switch contacts (38) are open.



BOTTOM FRONT VIEW

2. Move the pickup arm in toward the record post, by hand, until the trip switch (43) is closed.

3. With the trip switch closed, turn the adjustment screw (38A) counterclockwise until the safety switch contacts just close. This will be indicated by the solenoid being energized and starting of change cycle. As a safety factor, turn the adjustment screw counterclockwise an additional ⅜ to ½ turn.

TROUBLES

Mechanism Is Slow in Starting, or Motor Heats Up

1. Check lubrication.
2. Dirt in bearings. Clean with carbon tetrachloride and re-lubricate.
3. Be sure voltage and frequency are correct.
4. Damaged motor.
5. Eccentric stud out of adjustment. Check "Drive Pulley Adjustment."
6. Grease on drive pulley (24), idler wheel (25), and the turntable rim. Clean with carbon tetrachloride.
7. Room temperature abnormally low.

Changer Will Not Cycle

1. Open solenoid coil (18). Replace.
2. Defective wiring.
3. Defective trip switch (43).
4. Safety switch (38) defective or improperly adjusted (see Safety Switch Adjustment).
5. Eccentric stud (53) out of adjustment (see Drive Pulley Adjustment).

Changer Cycles Continuously

1. Eccentric stud (53) out of adjustment (see Drive Pulley Adjustment).
2. Tension spring (74) weak or disconnected. Replace.
3. Trip switch (43) shorted. Repair or replace.
4. Bell crank (52), or drive arm (68), binding on shaft.

Pickup Arm Trips Out of Grooves

1. Record changer not level.
2. Pickup shaft (20) binding in bearing.
3. Selector lever (57A) may be bent out of shape and binding against the detent plate (56).
4. Selector lever (57A) may be binding on the rivet in the detent plate. Correct by spreading the slot in the selector lever.

LUBRICATION

Factory lubrication should be sufficient for a long period of time. However, if it becomes necessary to lubricate the changer, clean all old oil and grease from changer with carbon tetrachloride.

Use Univis P-48 oil (Motorola Part No. 11M2340) on the eccentric and tube assembly (8), and stay-put grease (Motorola Part No. 11M476047) on all other moving parts.

When lubricating, be very careful not to allow oil or grease to come in contact with the rubber surfaces of the drive pulley (24), idler wheel (25), or the turntable rim. If oil or grease gets on any of these surfaces, it should be removed immediately with carbon tetrachloride.

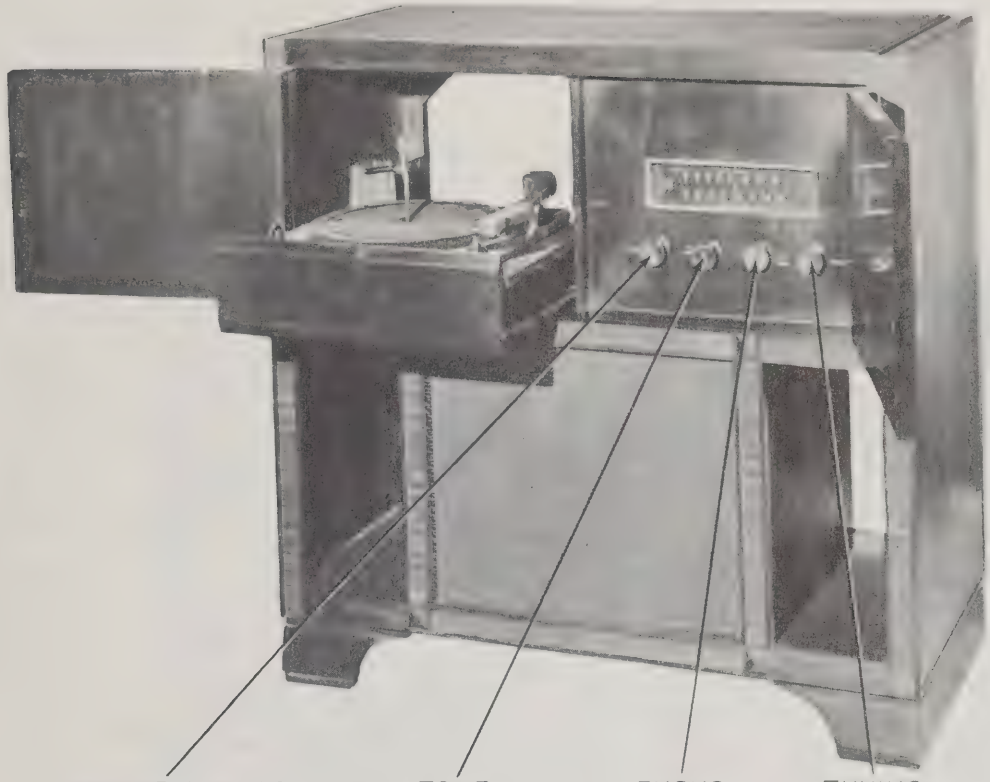
Wipe off all excess lubricant; over lubrication is dangerous.

PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1	45K470538	Pickup arm
	1X470570	Pickup arm (complete: includes crystal cartridge, needle, connecting lead and shaft assembly)
2	42A72314	Retainer clip
3	35A72628	Sponge rubber cushion for pickup arm
4	59A471595	Crystal cartridge, needle included
	47K471596	Life-long phono needle
5	1B470509	Cap and spindle assembly
6	47A74666	Rubber locating pin for cartridge
7	42A75809	Cartridge retainer clip
8	1B470524	Eccentric and tube assembly
9	35A470831	Rubber bumper
10	1X470535	Plate and clamp assembly
11	47A471481	Pickup lift rod
12	4A21941	"C" washer
13	4A21491	9/16 x .315 x .020 thick, brass washer
14	41A471469	Compression spring
15	4A21491	9/16 x .315 x .020 thick brass washer
16	7B471467	Pickup arm and guide bracket
17	47A71685	Pickup arm support pin
18	1X478181	Adjustment bracket (includes screw and nut)
19	3S476110	8-32 x ¾ Phillips R.H.M. screw, cadmium plated
20	47A471471	Pickup shaft
21	4A21941	"C" washer
22	2S1375	8-32 x 11/32 hex. nut, cadmium plated
23	46B470931	Record support post
24	1X71795	Drive pulley and shaft
25		Idler pulley (part of 33)
26		Fiber washer (part of 33)
27		"C" washer (part of 33)
28	59C470590	Turntable
29	3S7342	6-32 x ⅝ slotted binderhead machine screw
30	4S1765	Washer ½ x .147 x 1/64 thick, cadmium
31		Motor mounting grommet
32	43K71249	Spacer bushing
33	59K470458	Motor (including 25, 26, and 27)
34	47B470276	Record and bushing post
35	3S2291	8-32 x 5/16 slotted hex head machine screw
	4S7623	⅜ x 11/64 x .033 thick washer
36	46K70827	Pickup arm rest post (green plastic)
37		Base plate
38	1X478169	Safety switch assembly (complete with screws and mounting bracket)

Ref. No.	Part No.	DESCRIPTION
39	9A470260	Phono output receptacle
40		Screw for mounting record support post
41	45A470455	Trip lever
42	41A71635	Selector spring
43	1X478171	Trip switch assembly (complete with screws and mounting bracket)
44	1X470501	Core and pin assembly
45	24B470265	Solenoid coil
46		Bracket for solenoid
47	7B470266	Spindle bracket
48	2S7004	⅜-32 x 9/16 hex nut, cadmium plate
49	44B71634	Spindle gear
50	3S7109	6-32 x 5/16 slab head set screw
51	5K471663	Insulating grommet
52	1X470285	Bell crank lever assembly
53		Eccentric stud
54	4A21941	"C" washer
55	5K21337	Shoulder rivet .130 x .230
56	1X470480	Selector shaft and plate assembly
57	1X470539	Trip arm and selector lever assembly
57A		Selector lever
57B		Trip arm
58	3S9700	6-32 x 3/16 Allen head set screw
59	3S2697	No. 2 x ⅝ PKZ hex head sheet metal screw
60	41A471681	Tension spring
61	4A470946	Cam shaft washer
62	47B470269	Cam shaft
63	1X471999	Cam wheel and spring assembly
	41A471995	Selector stud guide spring
64	46A470257	Gear arm stud
65	1X470593	Gear arm and bushing assembly
66	4A21491	Washer, 9/16 x .315 x .020 thick
67	4A21941	"C" washer
68	1X470584	Drive arm assembly (complete with bearing and idler gear)
69	4S7597	Washer 7/16 x .171 x .033 thick
70	4S7671	No. 8 split lockwasher
71	3S7374	8-32 x 5/16 screw
72	42A76484	Retainer clip
73		Idler gear (part of 68)
74	41A470592	Tension spring ¼" x 1"
75	4A21941	"C" washer
76	41A14244	Tension spring ⅛" x 23/32"
77	3S9700	6-32 x 3/16 Allen head set screw
78	49A470239	Spindle stop and pin wheel

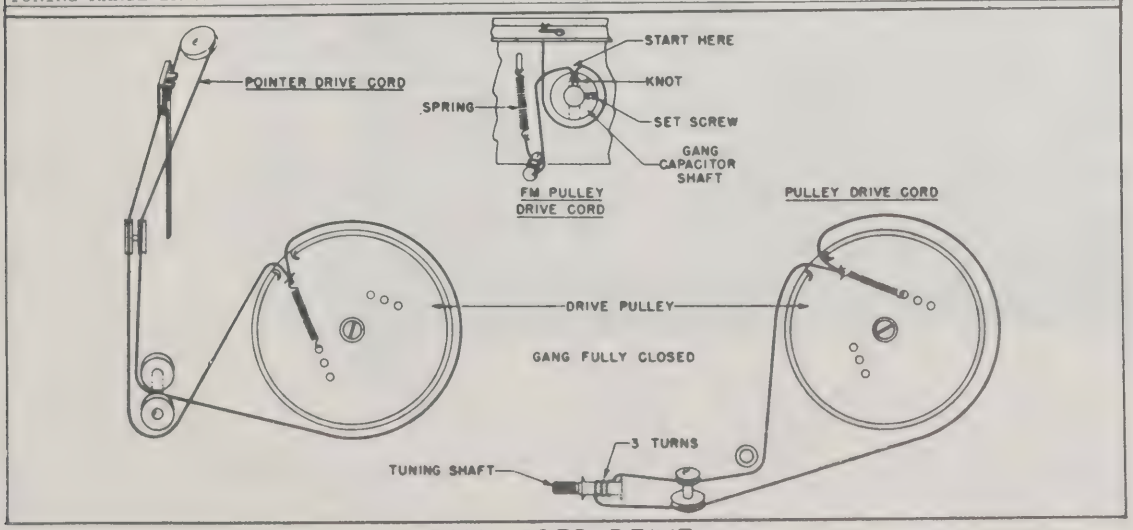
MOTOROLA MODEL
99FM21R (Ch. HS-170)



MOTOROLA MODEL
99FM21R (Ch. HS-170)

MOTOROLA MODEL 99FM21R

TRADE NAME	Motorola, Model 99FM21R (Ch. HS-170)		
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Illinois		
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Ant.		
TUBES(NINE)	Types 6AU6 RF Amp., 6BA7 Converter, 6BA6 1st IF Amp., 6AU6 FM 2nd IF Amp., 6AL5 Ratio Det., (2) 6V6GT Power Output, 7Z4 Rectifier		
POWER SUPPLY	110-120 Volts AC	RATING	.68 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC	FREQ. MOD.	88-108MC



DIAL CORD DRIVE

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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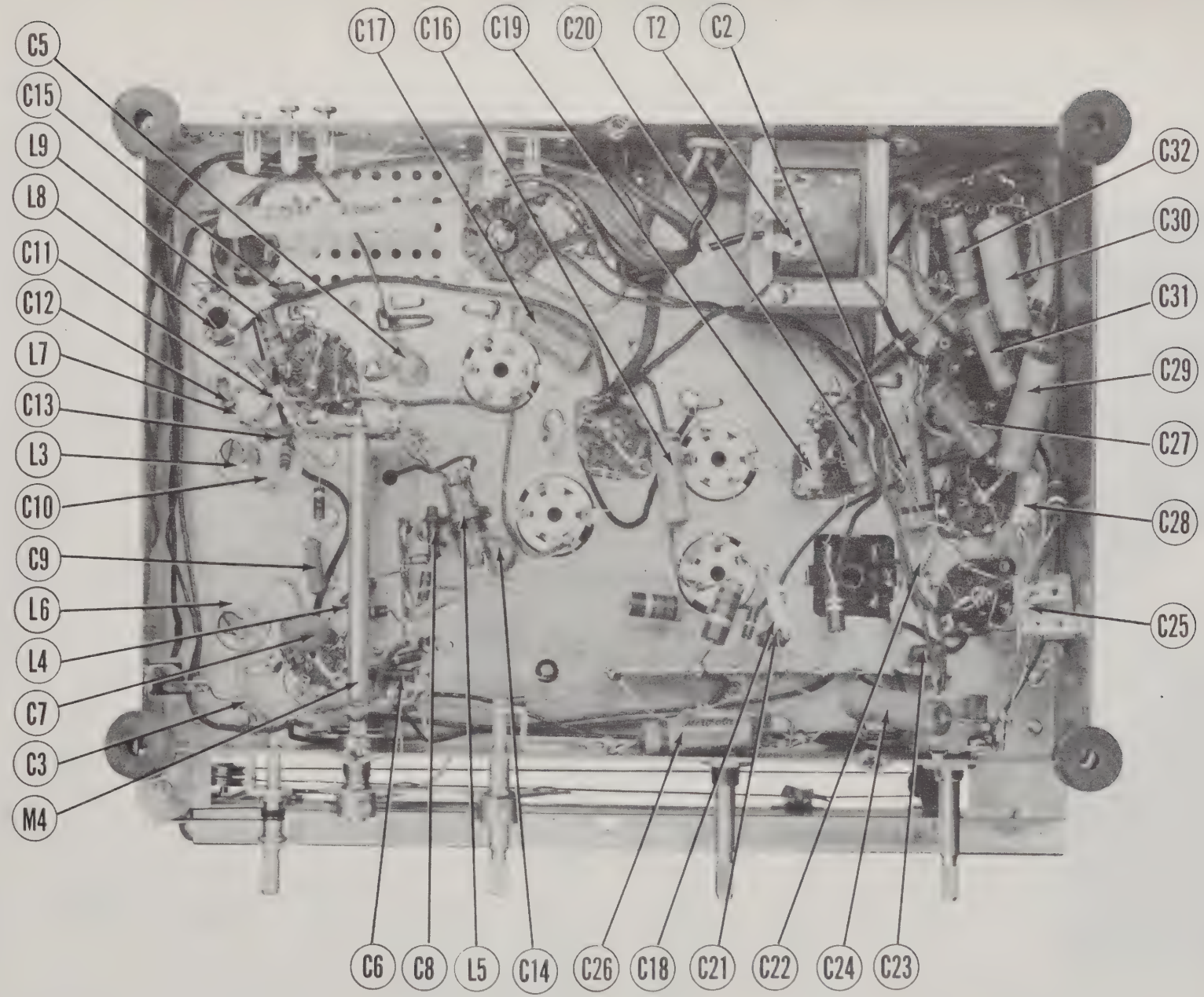
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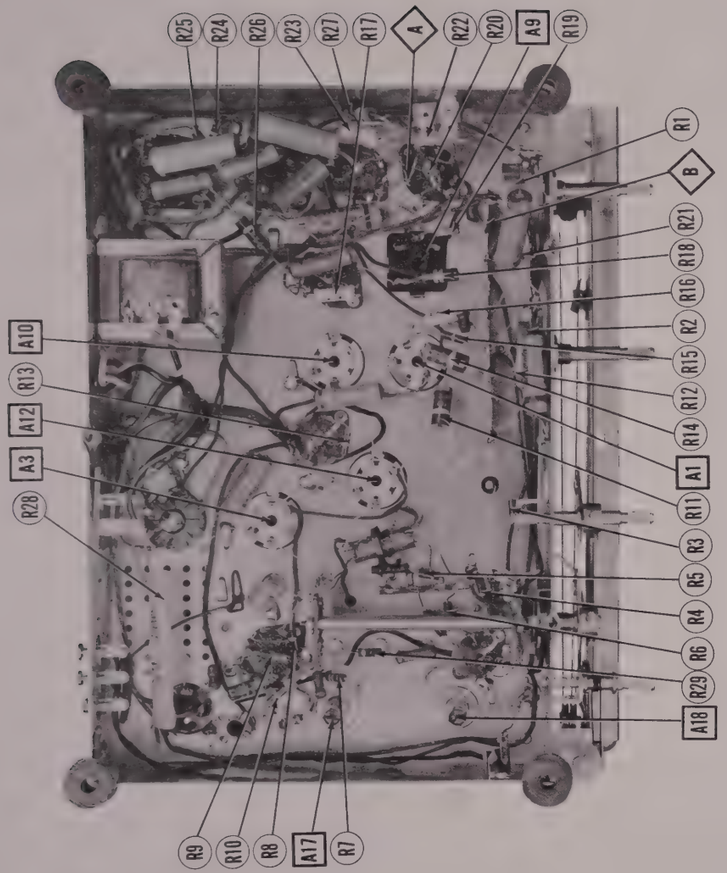

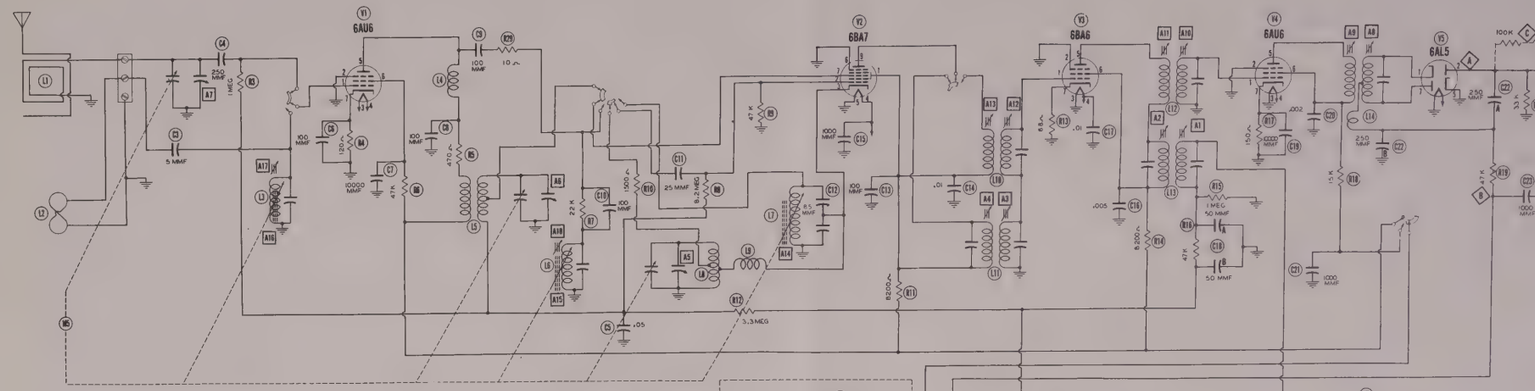

IF=455 KC AM

IF=10.7 MC FM

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AU6	-.2VDC	1.7	0V	6.3VAC	250VDC	100VDC	5VDC		
V2A	6BA7	110VDC	§-7.5VDC	1.1VDC	6.3VAC	0V	0V	-1.1VDC	0V	110VDC
* V2B	6BA7	105VDC	§-4.5VDC	1.1VDC	6.3VAC	0V	0V	-.4VDC	0V	105VDC
V3	6BA6	0V	0V	0V	6.3VAC	100VDC	100VDC	1.1VDC		
* V4	6AU6	0V	0V	0V	6.3VAC	120VDC	120VDC	1.1VDC		
* V5	6AL5	0V	-.5VDC	6.3VAC	0V	-.5VDC	0V	-.4VDC		
V6	6AV6	-.4VDC	0V	6.3VAC	0V	-.4VDC	0V	128VDC		
V7	6V6GT	0V	6.3VAC	225VDC	240VDC	0V	220VDC	0V	12VDC	
V8	6V6GT	0V	6.3VAC	225VDC	240VDC	0V	0V	0V	13VDC	
V9	724	0V	0V	280VDC	0V	0V	280VDC	275VDC	6.3VAC	

§TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AU6	5 Meg.	0Ω	0Ω	.1Ω	185Ω	147KΩ	120Ω		
V2A	6BA7	18.5KΩ	47KΩ	2.1Ω	.1Ω	0Ω	0Ω	4.3Meg.	0Ω	18.5KΩ
* V2B	6BA7	18.5KΩ	47KΩ	2.1Ω	.1Ω	0Ω	0Ω	25KΩ	0Ω	18.5KΩ
V3	6BA6	1Ω	0Ω	0Ω	.1Ω	18.5KΩ	18.5KΩ	6KΩ		
* V4	6AU6	.9Ω	0Ω	0Ω	.1Ω	115KΩ	115KΩ	150Ω		
* V5	6AL5	0Ω	33KΩ	.1Ω	0Ω	Inf.	0Ω	Inf.		
V6	6AV6	10 Meg.	0Ω	.1Ω	0Ω	1 Meg.	0Ω	180KΩ		
V7	6V6GT	18.5KΩ	.1Ω	190Ω§	150Ω§	470KΩ	175Ω§	0Ω	220Ω	
V8	6V6GT	Inf.	.1Ω	157Ω§	150Ω§	470KΩ	Inf.	0Ω	220Ω	
V9	724	0Ω	Inf.	77Ω	Inf.	Inf.	181Ω	150KΩ	.1Ω	

* VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.
§ Measured from pin 7 of V5

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (Grid) of 6BA7 (V2). Low side to chassis.	1400KC (400~ Mod.)	AM	Tuning gang fully open (counter-clock-wise)	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2.	.1MFD	"	1420KC	"	"	"	A5	"
3.	.1MFD	"	1400KC	"	1400KC	"	A6	"
4.		Loop	1400KC	"	Tune for max. output	"	A7	Reinstall set in cabinet. Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 1KΩ (± 1%) resistors in series from Point ◇ to B-. The junction of these two resistors is alignment Point ◇ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.001MFD	High side to pin 7 (Grid) of 6BA7 (V2). Low side to chassis.	10.7MC (Unmod.)	FM (center)	Tuning gang fully open	DC Probe to Point ◇ Common All, to chassis.	A8,A9, A9 thru A13	Detune A8 several turns counter-clockwise. Adjust for maximum deflection.
6.	.001MFD	"	"	"	"	DC Probe to Point ◇ Common	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Continue with step 8.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.001MFD	High side to pin 1 (Grid) of 6BA6 (V3). Low side to chassis.	10.7MC (450KC Sweep)	FM (center)	Point of non interference	Vert.Amp. to Point ◇ Low Side to chassis.	A8,A9, A10, All	Disconnect stabilizer cap C2. Detune A8 several turns counter-clockwise. Adjust A9, A10 and All for maximum amplitude and symmetry as per Fig 1.
6.	.001MFD	High side to pin 7 (Grid) of 6BA7 (V2). Low side to chassis.	"	"	"	"	A12, A13	Adjust for maximum amplitude and symmetry as per Fig 1.
7.	.001MFD	"	"	"	"	Vert.Amp. to Point ◇ Low Side to chassis.	A8,A9	Reconnect capacitor C2. Adjust A8 so 10.7MC occurs at center of cross over lines as per Fig 2. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω carbon res.	High side thru 300Ω to center antenna terminal. Low side to chassis.	10.7MC (Unmod.)	FM	105MC	DC Probe to Point ◇ Common to chassis.	A14	Adjust for maximum deflection.
9.	Turn tuning gang fully closed. Turn adjustments A13 and A16 counterclockwise until the tuning cores are at the bottom of the pipe, then turn A15 and A16 two turns clockwise.							
10.	300Ω carbon res.	High side thru 300Ω to center antenna terminal. Low side to chassis.	105MC	FM	Tune for max. deflection	DC Probe to Point ◇ Common to chassis.	A17, A18	Adjust for maximum deflection.
11.	"	"	90MC	"	"	"	A17, A18, A15, A16	Check A17 and A18 to see which direction of rotation increases deflection if clockwise rotation is required turn corresponding core nut (A15 and A16) 1/2 turn clockwise. If counter-clock-wise rotation is required turn corresponding core nut (A15 and A16) 1/2 turn counter-clockwise. Repeat steps 10 and 11 until no further increase in deflection can be made.
12.		Radiate signal into FM loop	105MC	"	"	"	A18	Radiate signal, or use a weak station and adjust for maximum deflection. with FM loop connected.

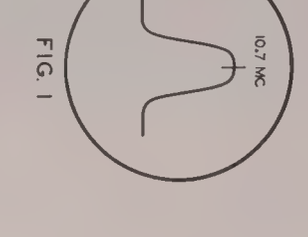

FIG. 1

FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6AU6	6AU6	7BK	
V2	Converter	6BA7	6BA7	8CT	
V3	1st IF Amp.	6BA6	6BA6	7BK	
V4	FM 2nd IF Amp.	6AU6	6AU6	7BK	
V5	Ratio Det.	6AL5	6AL5	6BT	
V6	DET-AVC-AF	6AV6	6AV6	7BT	
V7	Power Output	6V6GT	6V6GT	7AC	
V8	Power Output	6V6GT	6V6GT	7AC	
V9	Rectifier	7Z4	7Z4	5AB	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	300	23B690975	AF8H84G4A	UI-9CJ1070		EL-432	▲ Filter
B	40	250			BR505		TVA-20	■ Filter
C	40	250						▲ Filter
D	40	25						Output Cathode Bypass
C2	3	50	23K690543	PRS150/4	BR550		TVA-12	Stabilizing Cap.
C3	5		21K70720	1468-000005	5W5V5	NPOK-5	MS-55	Ant. Coupling
C4	250		21K77375	1468-00025	5W5T25	GP2K-250	1FM-325	RF Coupling
C5	.05	200	8R9821	P288-05	GT285		TM-15	AVC Filter
C6	100		21B77286	1468-0001	5W5T1	GP1K-100	1FM-31	RF Cath. Bypass
C7	10000		21K482726	P488-01	GT4S1	821-01	36C1	RF Screen Bypass
C8	100		21B77286	1468-0001	5W5T1	GP1K-100	1FM-31	RF Plate Decoupling
C9	100		21B77286	1468-0001	5W5T1	GP1K-100	1FM-31	RF Coupling
C10	100	500	21R6554	1468-0001	5W5T1	GP1K-100	1FM-31	RF Coupling
C11	25		21K28816	1468-000025	5W5Q25	GP1K-25	MS-425	Osc. Grid Cap.
C12	85		21K691203					Fixed Trimmer
C13	100		21B77286	1468-0001	5W5T1	GP1K-100	1FM-31	Conv. Decoupling
C14	.01	400	8R9809	P488-01	GT4S1	GP2-335-01	TM-11	Conv. Decoupling
C15	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	Conv. Fil. Bypass
C16	.005	600	8R9813	P688-005	GT6D5	GP2M-005	TM-25	1st IF Decoupling
C17	.01	400	8R9809	P488-01	GT4S1	GP2-335-01	TM-11	1st IF Fil. Bypass
C18A	50		Note 1	1468-00005	5W5Q5	GP1K-50	1FM-45	Diode RF Filter
B	50			1468-00005	5W5Q5	GP1K-50	1FM-45	Diode RF Filter
C19	10000		Note 2	P488-01	GT4S1	GP2-335-01	TM-11	2nd IF Cath. Bypass
C20	.002	400	8R9824	P688-002	GT6D2	GP2M-002	TM-22	2nd IF Decoupling
C21	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	RF Bypass
C22A	250		21B484337	1468-00025	5W5T25	GP2K-250	1FM-325	Diode Load Cap Note 5
B	250			1468-00025	5W5T25	GP2K-250	1FM-325	Diode Load Cap Note 5
C23	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	De-emphasis
C24	.05	200	8R9821	P288-05	GT285		TM-15	Audio Coupling
C25	5000		Note 3	1467-005	1D5D6	GP2M-005	1FM-25	Audio Coupling
C26	.005	600	8R9813	P688-005	GT6D5	GP2M-005	TM-25	Tone Comp.
C27	.01	400	8R9809	P488-01	GT4S1	GP2-335-01	TM-11	Tone Comp.
C28	250		Note 4	1468-00025	5W5T25	GP2K-250	1FM-325	AF Plate Bypass
C29	.05	400	8K470606	P488-05	GT4S5		TM-15	Audio Coupling
C30	.05	400	8K470606	P488-05	GT4S5		TM-15	Audio Coupling
C31	.002	400	8R9824	P688-002	GT6D2	GP2M-002	TM-22	Output Plate Bypass
C32	.002	400	8R9824	P688-002	GT6D2	GP2M-002	TM-22	Output Plate Bypass

Note 1. Items C18A, C18B, and R16 are combined into one unit obtainable under MFGR'S Part No. 21K690980.
Note 2. Items C19 and R17 are combined into one unit obtainable under MFGR'S Part No. 21K680007.
Note 3. Items C25 and R22 are combined into one unit obtainable under MFGR'S Part No. 21K691125.
Note 4. Items C28 and R23 are combined into one unit obtainable under MFGR'S Part No. 21K690979.
Note 5. When items C22A or C22B are replaced, replace both with capacitors of equal value.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	18K691192	Q13-137X		Volume control, tapped @ 300KΩ
B	Switch		Not Req.	76-1		Attach to R1A per instructions
R2	1 Meg.	½	18K77399	Q14-137		Tone control

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: MEISSNER PART No.	
L1	AM Loop Ant.	2.8Ω		24C690896		
L2	FM Loop Ant.	0Ω		24K690985		
L3	FM Ant.	0Ω		24C690584		Inductor and capacitor assembly.
L4	RF Choke	.2Ω		24A484025		
L5	AM RF Coil	2.6Ω	5Ω	24B690899		
L6	FM RF Coil	0Ω		24C690584		Inductor and capacitor assembly.
L7	FM Osc.	0Ω		24K690996		Inductor and capacitor assembly.
L8	AM Osc.	14.1Ω		24B690976		
L9	RF Choke	2.5Ω		24K780128		
L10	1st FM IF	2Ω	.9Ω	24B690540		
L11	1st AM IF	14.5Ω	14.5Ω	24B482863		
L12	2nd FM IF	5Ω	.9Ω	24B690541		
L13	2nd AM IF	14.5Ω	14.5Ω	24B482865		
L14	Ratio Det.	2Ω	0Ω	24B690542		

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA	NOTES
M1	Bayonet	6-8	.15	Brown	65X11854		Type #47
M2	Bayonet	6-8	.15	Brown	65X11854		Type #47

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: ASTATIC PART No.	REMARKS
M3		CQ-J or GC-J	

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M4	Switch	40B690977	AM-FM-Phono
M5	3 Gang Var.Cap.	19B690978	(21-454MMF, 26-234MMF, 13-186MMF)
	Dial Scale	34C690897	Glass
	Dial Pointer	52B74418	
	Cabinet	16K691044	Red Mahogany
	Knob	36K691070	Volume, Tone, Tuning
	Knob	36K691069	AM-FM-Phono

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push-on type control knobs.
2. Remove 16 screws holding rear cover. Remove cover.
3. Remove speaker plugs at speaker.
4. Remove phono motor power plug.
5. Remove phono pickup plug.
6. Remove FM antenna lead-in wires from terminals on rear of chassis.
7. Remove AM loop antenna leads from loop.
8. Remove 3 1/4" hex head bolts holding chassis in cabinet. Remove chassis.
9. Remove 5 wire brads holding loop antenna. Remove loop.
10. Remove 4 5/8" hex nuts holding speaker. Remove speaker.

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PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	
R3	1 Meg.	½	6R6004	BTS-1 Meg.	AVC Network
R4	150Ω	½	6R5551		RF Cathode
R5	470K	½	6R6046	BTS-47C	RF Plate Decoupling
R6	47KΩ	½	6R6048	BTS-47K	RF Screen
R7	22KΩ	½	6R6028	BTS-22K	Conv. Grid
R8	8.2 Meg.	½	6R5585	BTS-8.2 Meg.	AVC Network
R9	47KΩ	½	6R6048	BTS-47K	Osc. Grid
R10	150Ω	½	6R6038		Parasitic Supp.
R11	8200Ω	2	6R5725	BT-2-8200	Conv. Decoupling
R12	3.3 Meg.	½	6R6497	BTS-3.3 Meg.	AVC Network
R13	68Ω	½	6R2039		1st IF Cathode
R14	8200Ω	2	6R5725	BT-2-8200	1st IF Decoupling
R15	1 Meg.	½	6R6046	BTS-1 Meg.	Diode Load
R16	47KΩ	½	Note 1	BTS-47K	Diode Filter
R17	150Ω	½	Note 2		2nd FM IF Cathode
R18	15KΩ	1	6R6431	BTA-15K	2nd FM IF Decoupling
R19	47KΩ	½	6R6056	BTS-47K	De-emphasis
R20	33KΩ	½	6R6410	BTS-33K	Ratio Det. Diode Load
R21	33KΩ	½	6R6012	BTS-33K	Tone Compensation
R22	10 Meg.	½	Note 3	BTS-10 Meg.	AF Grid
R23	68KΩ	½	Note 4	BTS-68K	AF Plate
R24	470KΩ	½	6R6032	BTS-470K	Output Grid
R25	470KΩ	½	6R6032	BTS-470K	Output Grid
R26	220Ω	1	6R6389	BW-1-220	Output Cathode
R27	390Ω	1	6R5598	BTA-390	Output Plate
R28A	180Ω	3	17A690973	BW-2-180	Filter (Wire Wound)
B	180Ω			BW-2-180	Filter (Wire Wound)
R29	10Ω	½			Parasitic Supp. See Note 5

Note 1. Items C18, C18B and R16 are combined into one unit obtainable under MFGR'S Part No. 21K690980.
Note 2. Items C19 and R17 are combined into one unit, obtainable under MFGR'S Part No,21K680007.
Note 3. Items C25 and R22 are combined into one unit, obtainable under MFGR'S Part No.21K691125.
Note 4. Items C28 and R23 are combined into one unit, obtainable under MFGR'S Part No.21K690979.
Note 5. Not used in all models.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .68A	500VCT .092ADC	7VAC @ .9A Tapped @ 6.3 VAC @ 3.2A		25B691035	P-6012 ①	P-3148 ②	

① Mount vertically with universal mounting brackets and add series resistor to reduce plate voltage.
② Drill new mounting holes.

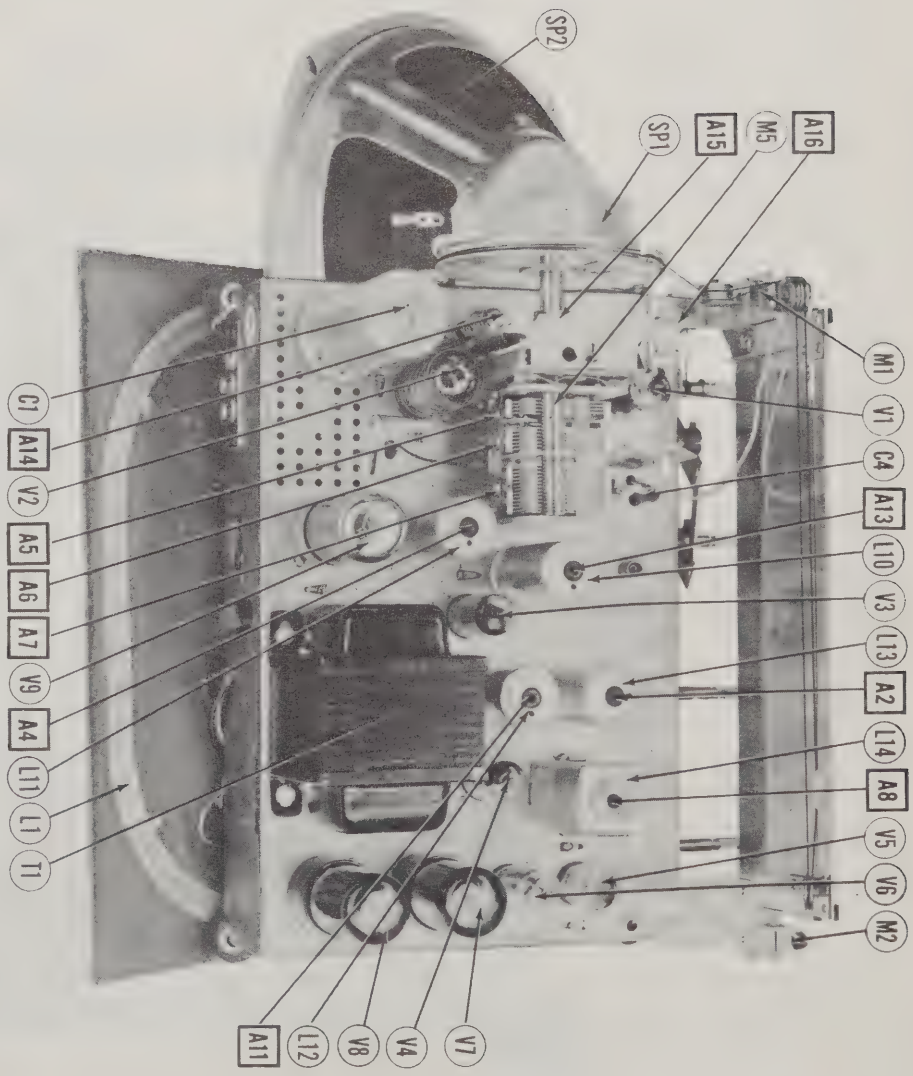
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MOTOROLA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	10.4 KΩ CT	3.7Ω	225Ω Each Pri.	.25Ω	25B690898	A-3850	A-2936 ③		③ Drill one new mounting hole,

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.		ST-119 ⑤		⑤ Replace output transformer to match 6-8Ω voice coil.
SP1	PM	3.7Ω	50K691177	MOD.P10-T	10A31	
	CONE DIA.	V. C. DIA.				
SP2	9 1/4"	1"				

CHASSIS—TOP VIEW



PHILCO
MODELS 50-527, 50-527-I

PHILCO
MODELS 50-527, 50-527-I

PHILCO MODEL 50-527

TRADE NAME	Philco, Models 50-527, 50-527-I
MANUFACTURER	Philco Corp., Tioga and "C" Sts., Philadelphia, Pa.
TYPE SET	AC Operated Superheterodyne Receiver with Electric Clock
TUBES (FIVE)	Types 7A8 Converter, 14A7 IF Amp., 14B6 DET-AVC-AF, 50L6GT Power Output, 35Y4 Rectifier
POWER SUPPLY	110-120 Volts AC — RATING: .26 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.

Volume control should be at maximum position. Output of signal generator should be no higher than is necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (Grid) of 7A8 (V1). Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully closed	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1600KC (400~ Mod.)	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1500KC (400~ Mod.)	1500KC	"	A6	"

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DATE 12/49 SET #80 FOLDER #11

PARTS LIST AND DESCRIPTIONS

PHILCO MODEL 50-527

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		PHILCO PART No.	STANDARD REPLACEMENT		
V1	Converter	7A8	7A8	8U	
V2	IF Amp.	14A7	14A7	8V	
V3	DET.-AVC-AF	14B6	14B6	8W	
V4	Power Output	50L6GT	50L6GT	7AC	
V5	Rectifier	35Y4	35Y4	5AL	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	40	150	30-2573	PRSA888D	EDL44415		TA-304	Filter Orange
B	30	150						Filter Red
C	30	150						Filter Blue
C2	5		30-1224-5	1468-000005	5W5V5	NP0K-5	MS-55	Ext. Ant. Coupling
C3	47		60-00515307	1468-00005	5W5Q5	GP1K-47	1FM-45	Osc. Grid Cap.
C4	10		30-1224-26	1469-00001	5R5Q1	NP0K-10	MS-41	Fixed Trimmer
C5	.05	200	61-0122	P288-05	GT2S5		TM-15	Decoupling
C6	.05	200	61-0122	P288-05	GT2S5		TM-15	AVC Filter
C7	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	Audio Coupling
C8	.01	600	61-0120	P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C9	330		60-10335407	1468-00035	5W5T3	GP2K-330	1FM-335	Output Grid Bypass
C10	.02	400	30-4599	P488-02	GT4S2		TM-12	Output Plate Bypass
C11	.2	400	45-3500-3	P488-22	GT4P2		72P53	Line Isolation
C12	.04	400	45-3500	P488-04	GT6S4		TM-14	Line Filter

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	
R1	500KΩ	½	33-5539-26	Q13-133	M-60-Z	Volume control

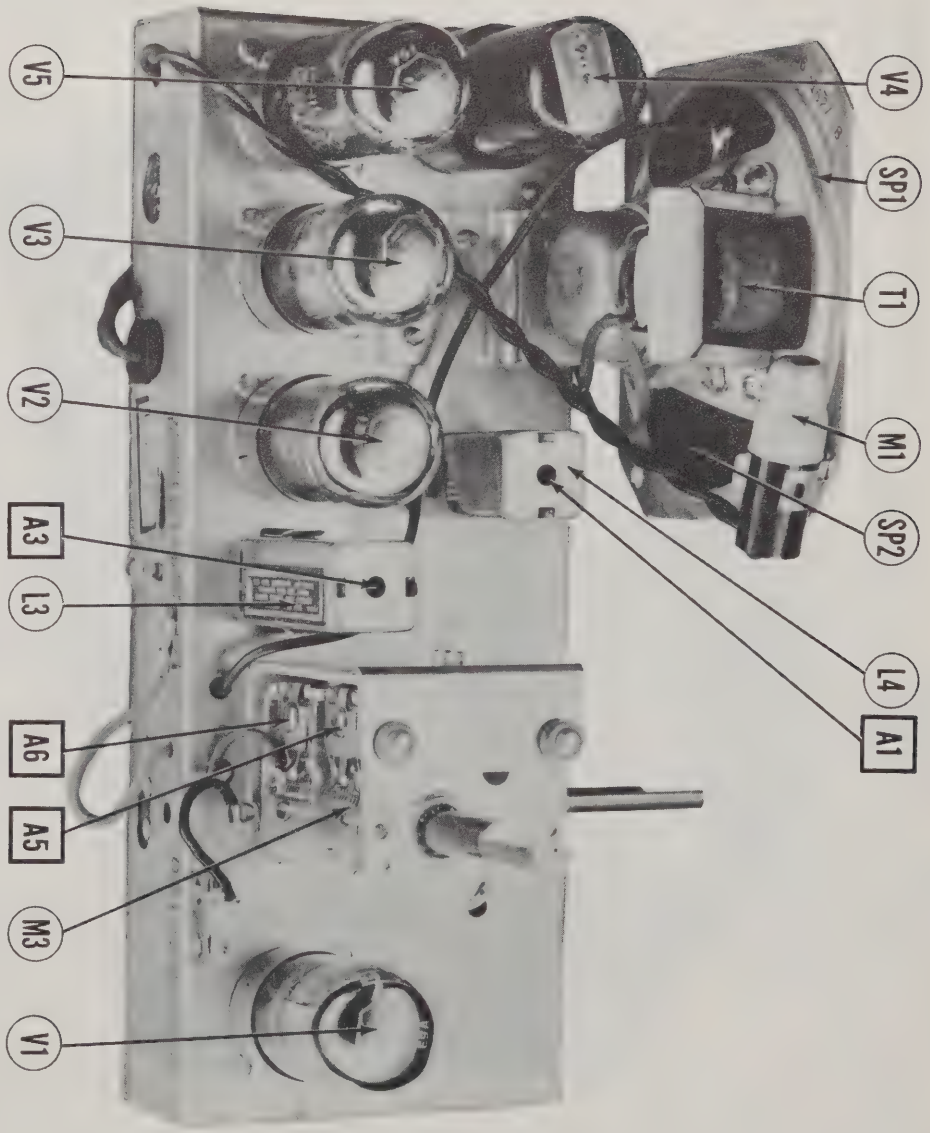
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
R2	150KΩ	½	66-4158340	BTS-150K	Ant. Isolation
R3	100KΩ	½	66-4108340	BTS-100K	Osc. Grid
R4	27KΩ	½	66-3278340	BTS-27K	Screen Dropping
R5	47KΩ	½	66-3478340	BTS-47K	Diode Filter
R6	2.2 Meg.	½	66-5228340	BTS-2.2 Meg.	AVC Network
R7	3.3 Meg.	½	66-5338340	BTS-3.3 Meg.	AF Grid
R8	470KΩ	½	66-4478340	BTS-470K	AF Plate
R9	470KΩ	½	66-4478340	BTS-470K	Output Grid
R10	130Ω	½	66-1138340	BW-½-120	Output Cathode (Wire Wound)
R11	1200Ω	½	66-2128340	BTS-1200	Filter
R12	220Ω	1	66-1224340	BW-1-220	Filter
R13	150KΩ	½	66-4158340	BTS-150K	Isolation

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2200Ω	3.5Ω	215Ω	.6Ω	36-1627-3	A-3332	A-3025	RO-2 ①	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA PHILCO PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-113 †		
SP1	PM	3.5Ω	36-1627-3	MOD.P4-X	4A07	† Drill and tap magnet frame.
	CONE DIA.	V. C. DIA.				
SP2	3 7/8"	9/16"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	REPLACEMENT DATA MEISSNER PART No.
L1	Loop Ant.	3Ω		32-4052-32	
L2	Osc. Coil	2Ω	6.5Ω	32-4263	
L3	Input IF	19Ω	19Ω	32-4160-6	
L4	Output IF	16Ω	16Ω	32-4240	

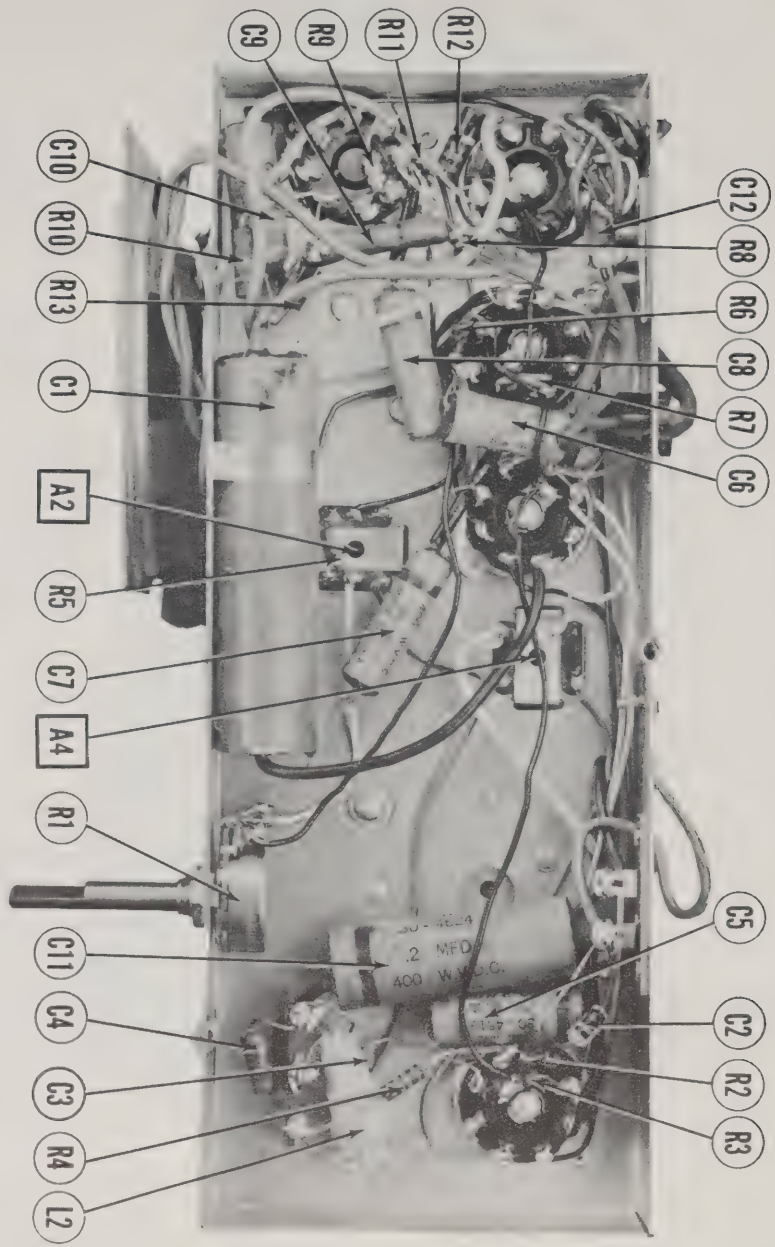
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA PHILCO PART No.		NOTES
M1	Bayonet	6-8	.15	Brown			Type #47

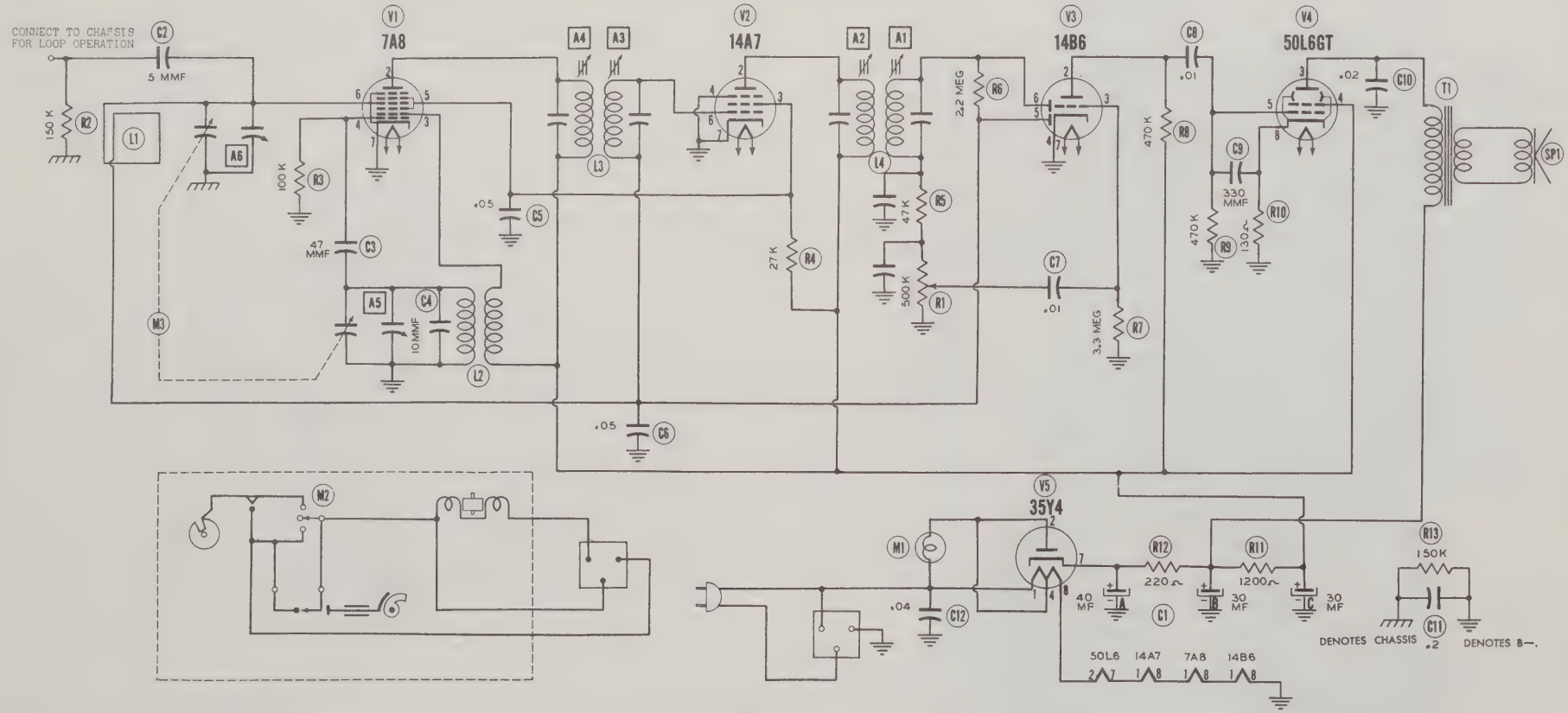
MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M2	Switch		On-Off-Auto.
M3	2 Gang Var. Cap.	31-2731-1	(31-497MMF, 19-260MMF)
	Cabinet	10745	Model 50-527
	Cabinet	10745-1	Model 50-527-I
	Dial	54-5055	Tuning
	Knob	27-4820	Model 50-527
	Knob	54-4118	Model 50-527-I

CHASSIS—BOTTOM VIEW



PHILCO MODEL 50-527



IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	7A8	20VAC	95VDC	95VDC	§-8.4VDC	40VDC	-.3VDC	0V	14VAC
V 2	14A7	34VAC	95VDC	40VDC	0V	0V	-.7VDC	0V	20VAC
V 3	14B6	14VAC	45VDC	-.7VDC	0V	-.7VDC	-.7VDC	0V	0V
V 4	50L6GT	0V	85VAC	105VDC	95VDC	0V	45VDC	34VAC	5.9VDC
V 5	35Y4	117VAC	113VAC	0V	113VAC	112VDC	0V	125VDC	85VAC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	7A8	20Ω	†1.5KΩ	†1.5KΩ	100KΩ	†28KΩ	2.7Meg.	0Ω	14Ω
V 2	14A7	34Ω	†1.5KΩ	†28KΩ	0Ω	0Ω	2.7Meg.	0Ω	20Ω
V 3	14B6	14Ω	†470KΩ	3.3Meg.	0Ω	2.7Meg.	550KΩ	0Ω	0Ω
V 4	50L6GT	Inf.	85Ω	141Ω	†1.5KΩ	470KΩ	†470KΩ	34Ω	130Ω
V 5	35Y4	110Ω	105Ω	Inf.	105Ω	30KΩ	Inf.	30KΩ	83Ω

† Measured from pin 7 of V5.

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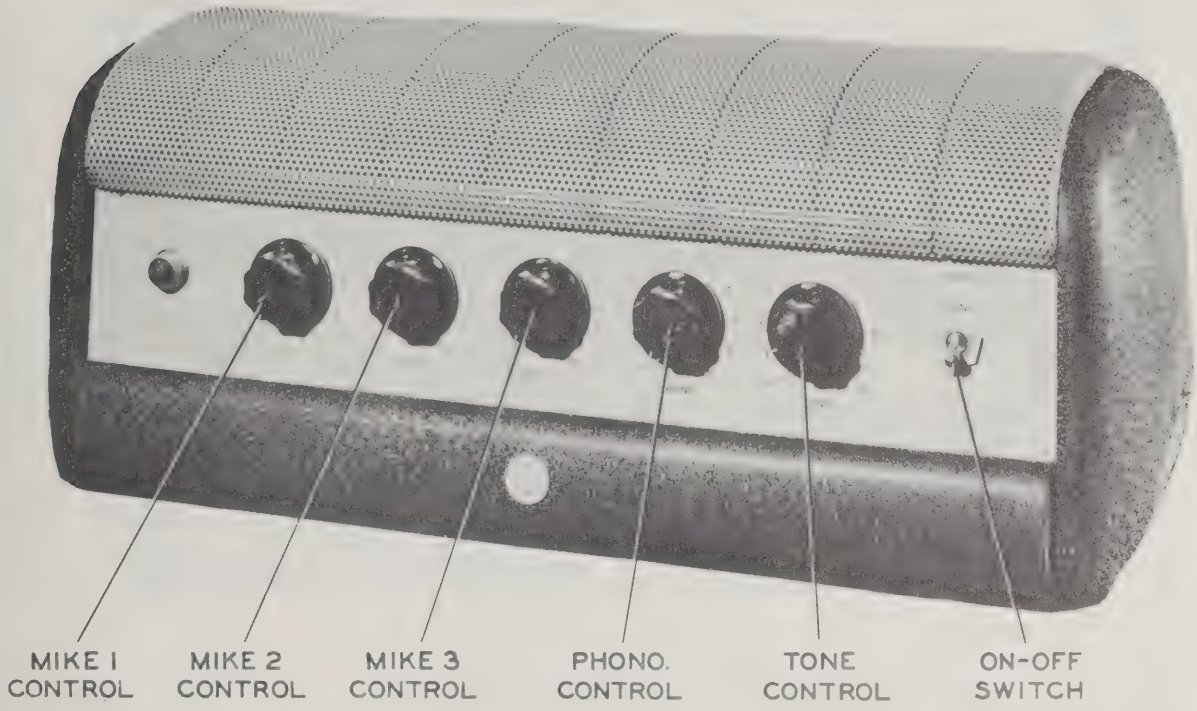
80-11

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RCA VICTOR MODELS MI-12289, MI-12290, MI-12296, MI-12298



RCA VICTOR MODELS MI-12289, MI-12290, MI-12296, MI-12298

RCA VICTOR MODEL MI-12298

TRADE NAME	RCA Victor, Model MI-12289, MI-12290, MI-12296, MI-12298
MANUFACTURER	RCA Victor, Div. of Radio Corp., of America, Camden, New Jersey
TYPE SET	AC Operated 4 Channel Audio Amplifier
TUBES(TEN)	6J7 Mic. 1 Pre.-Amp., 6J7 Mic. 2 Pre.-Amp., 6J7 Mic. 3 Pre.-Amp., 6J7 1st AF Amp., 6SN7GT 2nd AF-Phase Inverter, (4) 6V6GT Power Output, 5U4G Rectifier
POWER SUPPLY	105-125 Volts AC RATING: 1.3 Amp. @ 117 Volts AC

INPUT CHANNELS

Three separate microphone input stages, with built in mixing controls, are provided for use with microphones or low-level lines. Each of the input stages is resistance-capacity coupled to the mixer stage.

Two jacks are provided for phonograph pickup connection. The jack marked PHONO-1 is connected to the control grid circuit of the MIC-3 input stage; and the other jack, marked PHONO 2, is connected through a volume control to the control grid circuit of the mixer tube. The PHONO-1 jack allows this amplifier to be used with a low-level phonograph pickup.

The MI-12290 and MI-12298 amplifiers each have three low-impedance high-gain inputs, one high-impedance high-gain input and one high-impedance moderate gain input. The MI-12289 and MI-12296 each have three high-impedance high-gain inputs and one high-impedance moderate gain input.

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DATE 12/49 SET #80 FOLDER #12

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	Mic.#1 Pre. Amp.	6J7	6J7	7R	
V2	Mic.#2 Pre. Amp.	6J7	6J7	7R	
V3	Mic.#3 Pre.Amp.	6J7	6J7	7R	
V4	1st AF Amp.	6J7	6J7	7R	
V5	2nd AF Amp.- Phase Inverter	6SN7GT	6SN7GT	8BD	
V6	Power Output	6V6GT	6V6GT	7AC	
V7	Power Output	6V6GT	6V6GT	7AC	
V8	Power Output	6V6GT	6V6GT	7AC	
V9	Power Output	6V6GT	6V6GT	7AC	
V10	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1	40	450	37308	AFH8J	UP4045		EL-4	Filter
C2A	20	450	34889	AF44J	UP2245		EL-220	■ Filter
B	20	450						▲ Filter
C3A	40	150	53155	AF88D	UP4415		E-25	■ Output Cath. Bypass
B	40	150						▲ Output Cath. Bypass
C4A	20	450	34889	AF44J	UP2245		EL-220	■ Decoupling
B	20	450						▲ Decoupling
C5	25	25	53152	PRS25/25	BR252A		TA-25	1st AF Cath. Bypass
C6	25	25	53152	PRS25/25	BR252A		TA-25	Mic. 3 Pre.-Amp. Cath. Byp.
C7	25	25	53152	PRS25/25	BR252A		TA-25	Mic. 2 Pre.-Amp. Cath. Byp.
C8	25	25	53152	PRS25/25	BR252A		TA-25	Mic. 1 Pre.-Amp. Cath. Byp.
C9	.1	200	70617	P288-1	GT2P1		TM-1	Mic. 1 Pre.-Amp. Screen Byp.
C10	.1	200	70617	P288-1	GT2P1		TM-1	Mic. 2 Pre.-Amp. Screen Byp.
C11	.1	200	70617	P288-1	GT2P1		TM-1	Mic. 3 Pre.-Amp. Screen Byp.
C12	.05	400	70615	P488-05	GT4S5		TM-15	Audio Coupling
C13	.05	400	70615	P488-05	GT4S5		TM-15	Audio Coupling
C14	.05	400	70615	P488-05	GT4S5		TM-15	Audio Coupling
C15	.1	200	70617	P288-1	GT2P1		TM-1	1st AF Screen Bypass
C16	.05	400	70615	P488-05	GT4S5		TM-15	Audio Coupling
C17	1200	500	53154					Tone Compensation
C18	1200	500	53154					Tone Compensation
C19	.03	200	70613	P488-03	GT4S3		TM-13	Tone Compensation
C20	.1	600	70638	P688-1	GT6P1		TM-1	Audio Coupling
C21	.1	600	70638	P688-1	GT6P1		TM-1	Audio Coupling
C22	820	500	53153					Tone Compensation

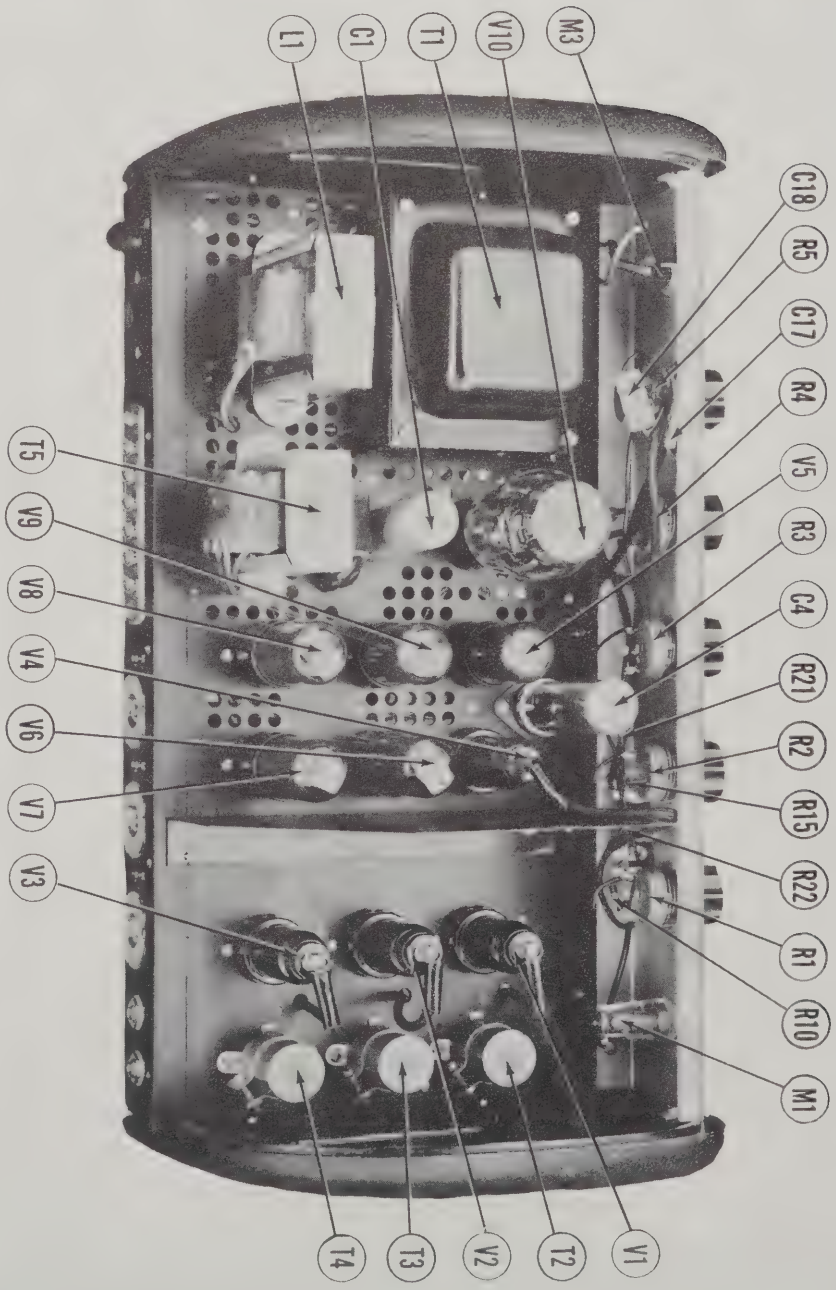
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RCA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	500KΩ	½	53144	Q13-133	M-60-Z	Mic. 1 Volume Control
R2	500KΩ	½	53144	Q13-133	M-60-Z	Mic. 2 Volume Control
R3	500KΩ	½	53144	Q13-133	M-60-Z	Mic. 3 Volume Control
R4	500KΩ	½	53144	Q13-133	M-60-Z	Phono Volume Control
R5A	1 Meg.	½	53145			Tone Control (Dual Control)
B	1 Meg.	½				Tone Control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RCA PART No.	IRC PART No.	IDENTIFICATION CODES
R6	100KΩ	½		BTS-100K	Mic. 1 Pre.-Amp. Grid
R7	1800Ω	½		BTS-1800	Mic. 1 Pre.-Amp. Cathode
R8	1.2 Meg.	½		BTS-1.2 Meg.	Mic. 1 Pre.-Amp. Screen
R9	270KΩ	½		BTS-270K	Mic. 1 Pre.-Amp. Plate

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA RCA PART No.	REPLACEMENT DATA IEC PART No.	IDENTIFICATION CODES
R10	470KΩ	½		BTS-470K	Isolation
R11	100KΩ	½		BTS-100K	Mic. 2 Pre.-Amp. Grid
R12	1800Ω	½		BTS-1800	Mic. 2 Pre.-Amp. Cathode
R13	1.2 Meg.	½		BTS-1.2 Meg.	Mic. 2 Pre.-Amp. Screen
R14	270KΩ	½		BTS-270K	Mic. 2 Pre.-Amp. Plate
R15	470KΩ	½		BTS-470K	Isolation
R16	470KΩ	½		BTS-470K	Tone Compensation
R17	100KΩ	½		BTS-100K	Mic. 3 Pre.-Amp. Grid
R18	1800Ω	½		BTS-1800	Mic. 3 Pre.-Amp. Cathode
R19	1.2 Meg.	½		BTS-1.2 Meg.	Mic. 3 Pre.-Amp. Screen
R20	270KΩ	½		BTS-270K	Mic. 3 Pre.-Amp. Plate
R21	470KΩ	½		BTS-470K	Isolation
R22	470KΩ	½		BTS-470K	Isolation
R23	10KΩ	½		BTS-10K	Decoupling
R24	1500Ω	½		BTS-1500	1st AF Cathode
R25	1.2 Meg.	½		BTS-1.2 Meg.	1st AF Screen
R26	220KΩ	½		BTS-220K	1st AF Plate
R27	150KΩ	½		BTS-150K	2nd AF Grid
R28	270KΩ	½		BTS-270K	2nd AF Grid
R29	560Ω	½		BTS-560	Tone Compensation
R30	1500Ω	½		BTS-1500	2nd AF Cathode
R31	56KΩ	1		BTA-56K	2nd AF Plate
R32	1500Ω	½		BTS-1500	Phase Inv. Cathode
R33	10KΩ	½		BTS-10K	Phase Inv. Grid
R34	33KΩ	½		BTS-33K	Phase Inv. Grid
R35	56KΩ	1		BTA-56K	Phase Inv. Plate
R36	39KΩ	½		BTS-39K	Feedback
R37	82KΩ	½		BTS-82K	Output Grid
R38	27KΩ	½		BTS-27K	Output Grid
R39	27KΩ	½		BTS-27K	Output Grid
R40	330Ω	2		BW-2-330	Output Cathode
R41	39Ω	½			Parasitic Supp.
R42	39Ω	½			Parasitic Supp.
R43	100KΩ	½		BTS-100K	Output Grid
R44	27KΩ	½		BTS-27K	Output Grid
R45	27KΩ	½		BTS-27K	Output Grid
R46	330Ω	2		BW-2-330	Output Cathode
R47	39Ω	½			Parasitic Supp.
R48	39Ω	½			Parasitic Supp.
R49	27KΩ	2		BT-2-27K	Tone Compensation
R50	27KΩ	2		BT-2-27K	Tone Compensation
R51	10KΩ	½		BTS-10K	Decoupling
R52A	800Ω	50	53151	AB-800	Filter (Wire Wound)
B	10,500Ω				Bleeder (Wire Wound)
R53	39Ω	2		BW-2-39	Filter

TRANSFORMER (POWER)

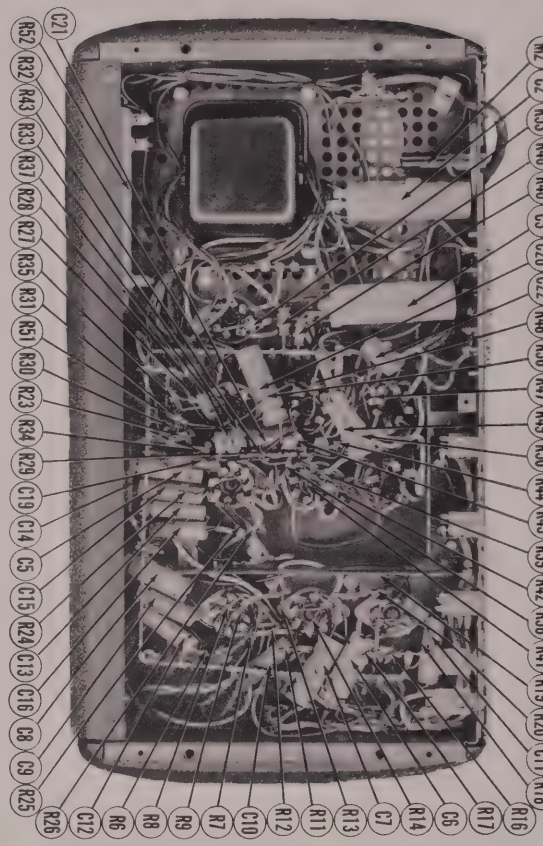
ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1A	117VAC	730VCT	5VAC	6.3VCT	53834 *	P-6165 §		
	@ 1.3A	.175ADC	@ 3A	@ 3.7A				
B					53836 †			

* Used in models MI-12296 and 12298 only.
† Used in models MI-12289 and 12290 only.
§ Use series resistor in high voltage filter for low power.

TRANSFORMER (INPUT)

ITEM No.	RATING TURNS RATIO PRI. TO SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T2	1 TO 11	462Ω CT	230Ω	52775				Models MI-12290, MI-12298 only.
T3	1 TO 11	462Ω CT	230Ω	52775				Models MI-12290, MI-12298 only.
T4	1 TO 11	462Ω CT	230Ω	52775				Models MI-12290, MI-12298 only.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T5	4900Ω CT	250Ω 60Ω 15Ω 8Ω 4Ω	385Ω CT	11Ω 4.7Ω 1.2Ω .9Ω .7Ω	53833				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.175A	63Ω	3 Henries	53835	C-2325	C-2944 ‡	TR-4200	‡ Drill one new mounting hole.

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA RCA PART No.		NOTES
M1	Bayonet	6-8	.25	Blue	11891		Type #44

MISCELLANEOUS

ITEM No.	PART NAME	RCA PART No.	NOTES
M2	Fuse	10907	AGC 3 Amp.
M3	Switch Knob	13462 54039	On-Off

OUTPUT CONNECTIONS

Leads from the output transformer in the amplifier are connected to a terminal board on the rear of the chassis. The terminals on this board are marked 0, 4, 8, 15, 60 and 250 ohms. In the following table the first column gives the connections necessary for the load impedances shown in the last column.

Terminals	Output Voltage Low Power (volts)	Output Voltage High Power (volts)	Load Impedance (ohms)
4 and 8			0.67*
8 and 15			1.1*
4 and 15			3.5*
0 and 4	10	11	4
0 and 8	14.2	15.6	8
0 and 15	19.5	21.4	15
8 and 60	24.5	26.9	24
4 and 60	29	31.9	33
0 and 60	38.5	42.3	60
15 and 250	60	66	143
8 and 250	65.5	72	171
4 and 250	69	75.9	191
0 and 250	79	86.9	250

* Use only for light loads, such as for monitoring.

NOTE: When a 250-ohm load impedance is connected to the 0 and 250 taps, the output line may be balanced by disconnecting the black lead from the 0 ohm terminal on the output terminal TB-15 and then connecting this lead to the 60Ω terminal in TB-15.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J7	0V	#3.2VAC	85VDC	40VDC	1.8VDC	0V	#3.2VAC	1.8VDC	TOP CAP 0V
V 2	6J7	0V	#3.2VAC	85VDC	40VDC	1.8VDC	0V	#3.2VAC	1.8VDC	0V
V 3	6J7	0V	#3.2VAC	75VDC	37VDC	1.6VDC	0V	#3.2VAC	1.6VDC	0V
V 4	6J7	0V	#3.2VAC	100VDC	40VDC	1.6VDC	4.8VDC	#3.2VAC	1.6VDC	0V
V 5	6SN7GT	.1VDC	135VDC	4.8VDC	.2VDC	135VDC	4.9VDC	#3.2VAC	#3.2VAC	
V 6	6V6GT	0V	#3.2VAC	340VDC	315VDC	.3VDC	340VDC	#3.2VAC	23VDC	
V 7	6V6GT	0V	#3.2VAC	340VDC	315VDC	.3VDC	340VDC	#3.2VAC	23VDC	
V 8	6V6GT	0V	#3.2VAC	340VDC	315VDC	.3VDC	340VDC	#3.2VAC	23VDC	
V 9	6V6GT	0V	#3.2VAC	340VDC	315VDC	.3VDC	0V	#3.2VAC	23VDC	
V 10	5U4G	0V	365VDC	0V	375VAC	0V	375VAC	0V	365VDC	

6.3VAC measured across filaments

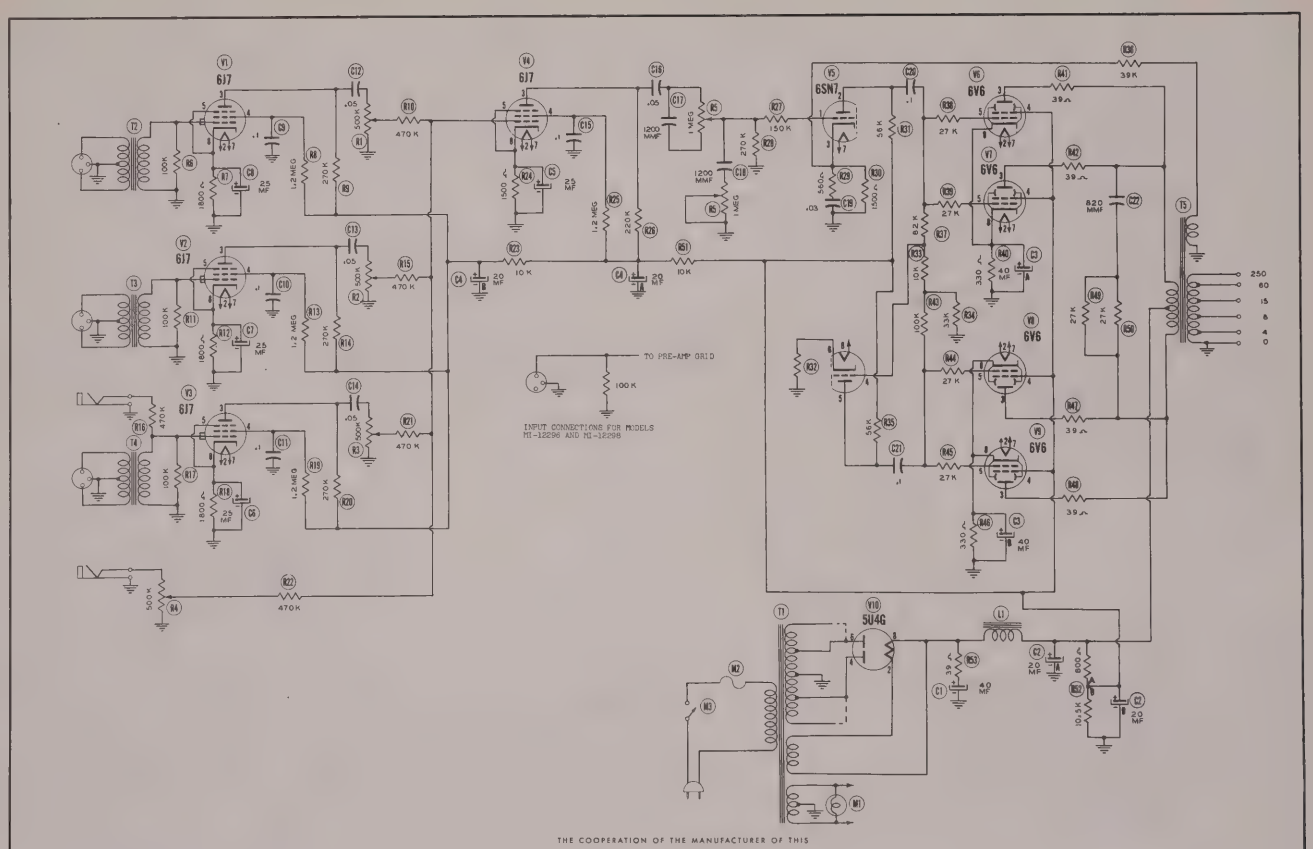
RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J7	0Ω	.1Ω	150KΩ	1.2MEG.	1.8KΩ	Inf.	.1Ω	1.8KΩ	TOP CAP 2.2MEG.
V 2	6J7	0Ω	.1Ω	125KΩ	1.2MEG.	1.8KΩ	Inf.	.1Ω	1.8KΩ	TOP CAP 2.2MEG.
V 3	6J7	0Ω	.1Ω	125KΩ	1.2MEG.	1.8KΩ	Inf.	.1Ω	1.8KΩ	TOP CAP 2.2MEG.
V 4	6J7	0Ω	.1Ω	125KΩ	1.2MEG.	1.8KΩ	2KΩ	.1Ω	1.8KΩ	1.2MEG.
V 5	6SN7GT	420KΩ	156KΩ	1.5KΩ	43KΩ	156KΩ	1.5KΩ	.1Ω	.1Ω	
V 6	6V6GT	0Ω	.1Ω	127Ω	185Ω	160KΩ	128Ω	.1Ω	332Ω	
V 7	6V6GT	0Ω	.1Ω	127Ω	185Ω	160KΩ	128Ω	.1Ω	332Ω	
V 8	6V6GT	0Ω	.1Ω	129Ω	185Ω	160KΩ	250Ω	.1Ω	330Ω	
V 9	6V6GT	0Ω	.1Ω	129Ω	185Ω	160KΩ	125Ω	.1Ω	336Ω	
V 10	5U4G	Inf.	11KΩ	Inf.	75Ω	Inf.	70Ω	Inf.	11KΩ	

† Measured from pin 8 of V10

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

DATE 12/49 SET #80 FOLDER #12



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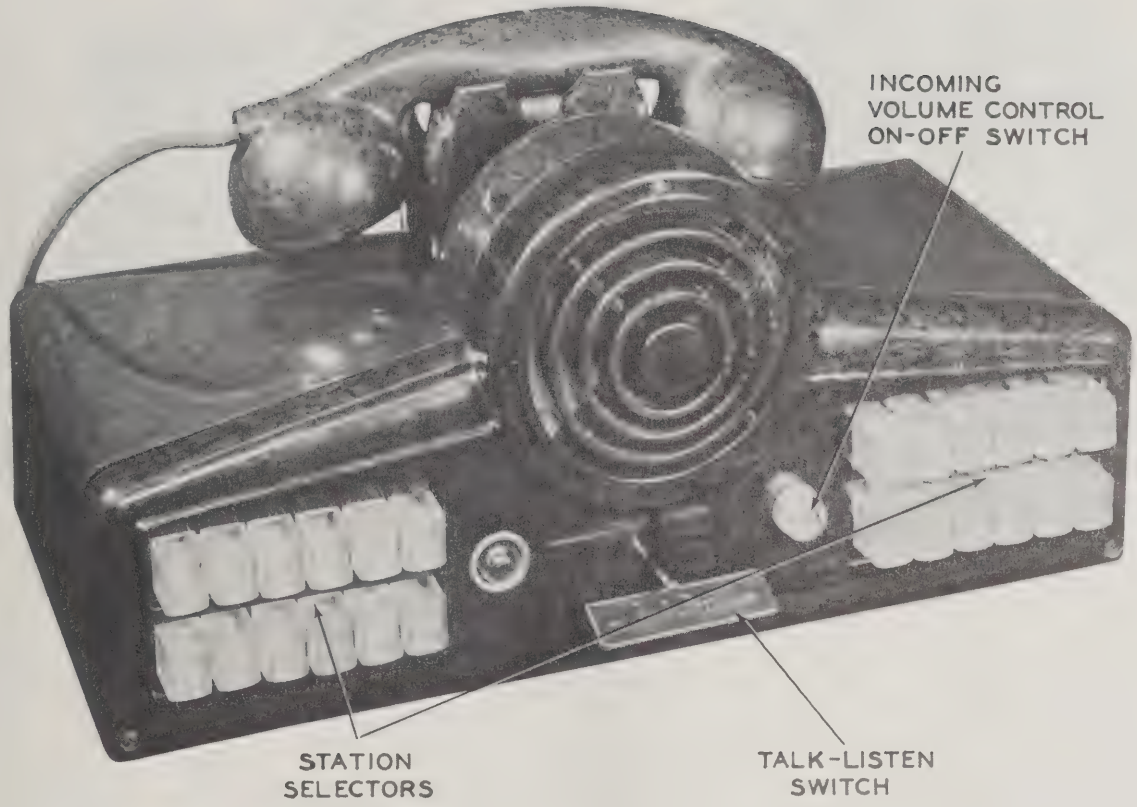
RAULAND MODELS 2206, 2206H,
2212, 2212H, 2218, 2218H, 2224, 2224H



RAULAND MODELS 2206, 2206H,
2212, 2212H, 2218, 2218H, 2224, 2224H

RAULAND MODEL 2224H

TRADE NAME	Rauland, Models 2206, 2206H, 2212, 2212H, 2218, 2218H, 2224, 2224H
MANUFACTURER	The Rauland Corp., 4245 Knox Ave., Chicago, Illinois
TYPE SET	AC-DC Operated Intercommunication System
TUBES(TWO)	Types 12AU6 AF Amp., 50B5 Power Output
POWER SUPPLY	110-120 Volts AC-DC RATING .22 Amp. @ 117 Volts AC

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DATE 12/49 SET #80 FOLDER 13

PARTS LIST AND DESCRIPTIONS

RAULAND
MODEL 2224H

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RAULAND PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	AF Amp.	12AU6	12AU6	7BK	
V2	Power Output	50B5,	50B5	7BZ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RAULAND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150	CE-157	AF886D4A *	UP444315		EL-443*	◓ Filter
B	40	150		PRS150/50			UT-501	■ Filter
C	30	150						▲ Filter
D	30	150						Filter
C2A	15	150	CE-956B	AF444D4A	UP2225			◓ AF Amp. Decoupling
B	20	25			BR1615			■ Output Cathode Bypass
C	20	25						AF Cathode Bypass
C3	16	350		PRS350/16	BR1635A		UT-163	Transmitter Bypass †
C4	.5	200		P288-5	GT2P5		TC-5	Receiver Bypass
C5	200	500		1468-0002	5W5T2	GP2K-200	1FM-32	Fixed Trimmer
C6	.05	400		P488-05	GT4S5		TM-15	AF Screen Bypass
C7	150	500		1468-00015	5W5T15	GP2K-150	1FM-315	Audio Coupling
C8	.2	200		P488-22	GT4P2		TC-2	Audio Coupling
C9	.05	400		P488-05	GT4S5		TM-15	Line Isolation

* Omit bypass section.
† Some models use 20MFD/25 Volts in this application.

CONTROLS

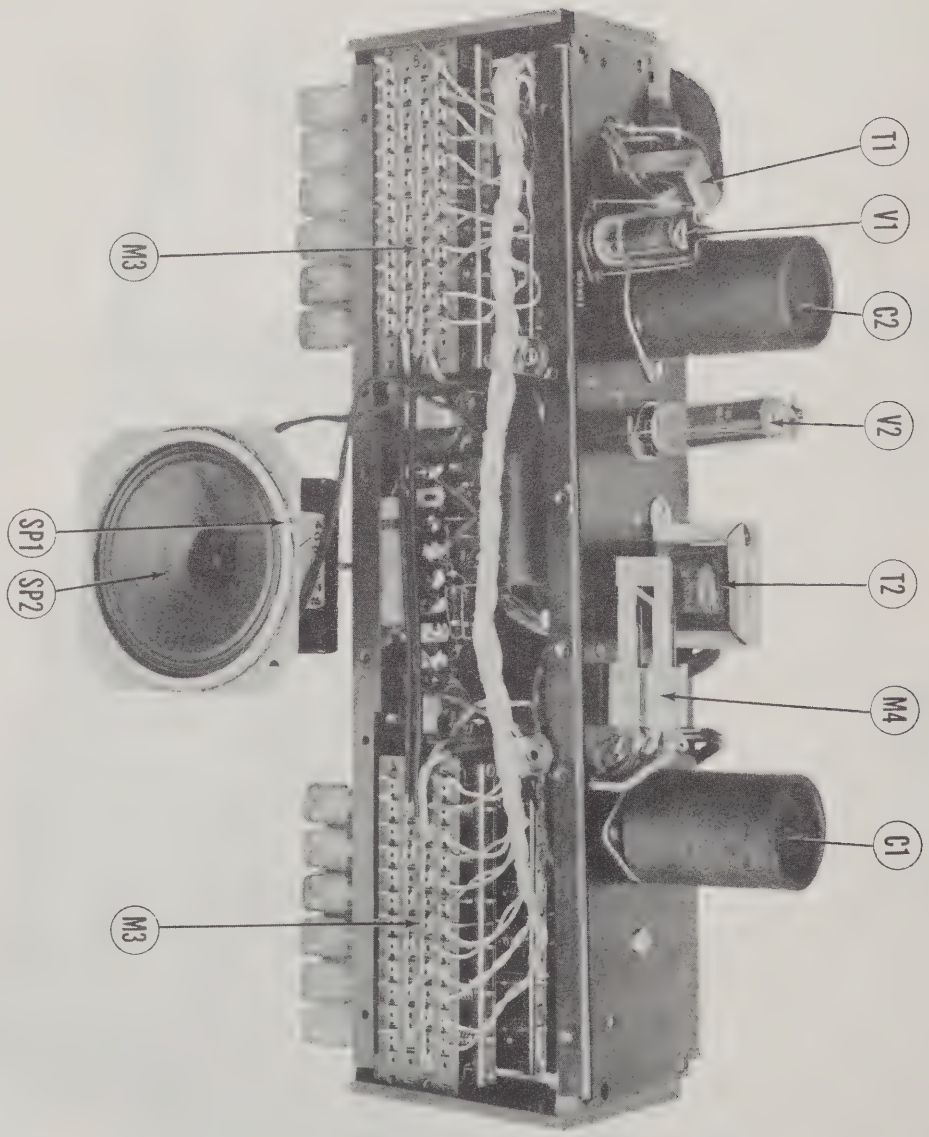
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAULAND PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500Ω	½	RP-501B	Q11-103		Incoming volume control
B	Switch		Not Req.	76-1		Attach to R1A per instructions
R2A	1 Meg.	½	RP-105W	Q13-137	15/16"-63-Z#	Out going volume control
B	Shaft		Not Req.	Not Req.	Not Req.	Attach to R2A per instructions

File shaft to duplicate original.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAULAND PART No.	IRC PART No.	IDENTIFICATION CODES
R3	5600Ω	½		BTS-5600	AF Cathode
R4	2.2 Meg.	½		BTS-2.2 Meg.	AF Screen
R5	470KΩ	½		BTS-470K	AF Plate
R6	10KΩ	½		BTS-10K	AF Decoupling
R7	150Ω	½		BW-½-150	Output Cathode
R8	220Ω	½		BW-½-220	Output Transformer Shunt
R9	2200Ω	½		BTS-2200	Filter
R10	220Ω	1		BW-1-220	Filter
R11	220Ω	1		BW-1-220	Filter
R12	100KΩ	½		BTS-100K	Series Neon
R13	68Ω	1			Surge Limiter
R14	400Ω	20		DG-400	Filament Dropping (Wire Wound)
R15	220Ω	½		BW-½-220	Volume Control Shunt
R16	68Ω	½		BW-½-68	Voice Coil Shunt
R17	10Ω	1		BW-1-10	Tone Compensation

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (INPUT)

ITEM No.	RATING			REPLACEMENT DATA				INSTALLATION NOTES
	TURNS RATIO PRI. TO SEC.	DC RES. PRI.	DC RES. SEC.	RAULAND PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
T1	1 TO 20	5.8Ω CT	550Ω	LA-0043				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE PRI.	IMPEDANCE SEC.	DC RES. PRI.	DC RES. SEC.	RAULAND PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
T2	1400Ω	50Ω	55Ω	4.1Ω	LO-0056		A-2902		

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD PM	V. C. IMP. 47Ω	RAULAND PART No.	JENSEN PART No.	QUAM PART No.	‡ Supplied on order. Give type and voice coil impedance.
SP1			US-0012		‡	
	CONE DIA.	V. C. DIA.				
SP2	3 1/4"	9/16"				

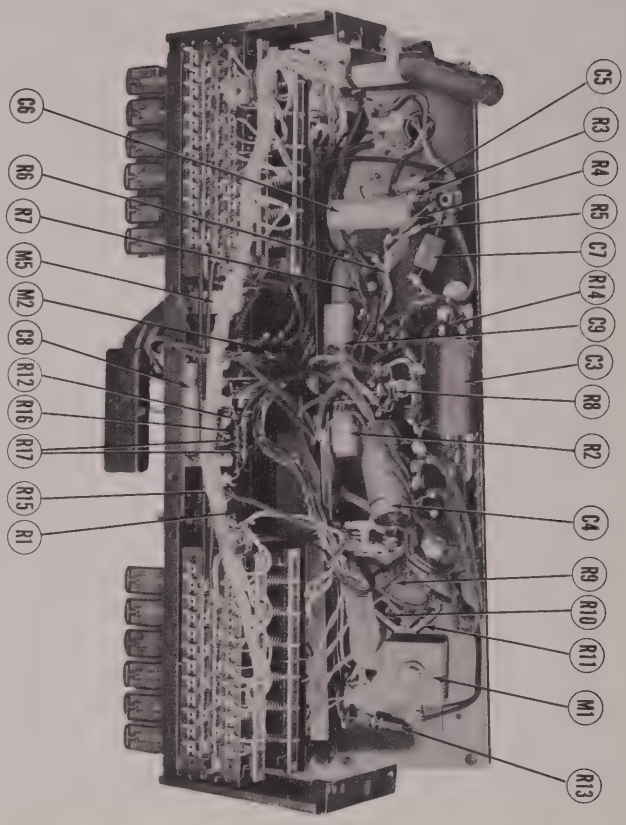
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	RAULAND PART No.	SYLVANIA PART No.		
M1	.040A	JR-0013	NC-5		

MISCELLANEOUS

ITEM No.	PART NAME	RAULAND PART No.	NOTES
M2	Switch		Selector
M3	Switch		Pushbutton
M4	Switch		Hand-Set
M5	Lamp		Neon
M6	Hand Set		
M7	Junction Box		

CHASSIS—BOTTOM VIEW



INSTALLATION AND SERVICE NOTES

All circuit connections are made in the junction boxes. No circuit changes are made in the Amplicall units themselves.

The arrangement of button numbering is from left to right, first in the upper row, then in the same direction in the lower row. In order to make the buttons follow sequence given, the circuit numbers shown in Figure 1 must be observed.

Figure 2 is a detailed wiring diagram and color code for connecting the junction boxes. Each contact of the circuits used is wired in parallel with the corresponding contact in all other junction boxes on the system.

To connect a given junction box so that an Amplicall unit plugged into it will respond to a certain number, for example #4, a pair of wire is run from the insulated tie lugs to the selected circuit in the junction box. In this case #4 circuit, which occupies pins number 1 and 2 of socket 2. An example of this is shown in Figure 1.

If a unit has been repaired and fails to operated when plugged into the junction box a check should be made for short circuits or opens in the junction boxes or cable network. Disconnect all units from their junction boxes. With a continuity meter test from each wire to all other wires and to ground for shorts. Checking from one junction box will check the entire system for shorts since they are all in parallel. To check for opens it is convenient to make up a plug with the pins of each circuit shorted. By plugging it in the junction box at one end of the system, a continuity check of each circuit can be made at the other end of the line.

If excessive hum is experienced during operation, connect pin 8 of socket 2 in the junction box to a water pipe or a good ground connection.

REMOVING CHASSIS FROM CABINET

The procedure is as follows:

1. Remove the three screws on the front panel of the amplifier.
2. Remove volume control knob by pulling directly away from the cabinet.
3. Remove the two large screws on the bottom of the Amplicall unit.
4. Press the talk-listen lever down and remove the front panel, easing the upper portion out from the cabinet so that the volume control shaft will clear its opening in the cabinet.
5. With the front panel removed, pull the chassis from the cabinet straight out and at the same time push on the multiple pair cables and AC cable from the back.
6. To reinstall the amplifier in the cabinet the procedure should be reversed.

Should it be necessary to completely remove the cabinet from the chassis and cable assembly such as in the replacement of a cabinet, the above procedure should be followed except that the metal cover on the lower back portion of the cabinet should be removed as well as the large screws holding the chassis to the cabinet. There is sufficient clearance in the cabinet to pass the junction plug and telephone handset.

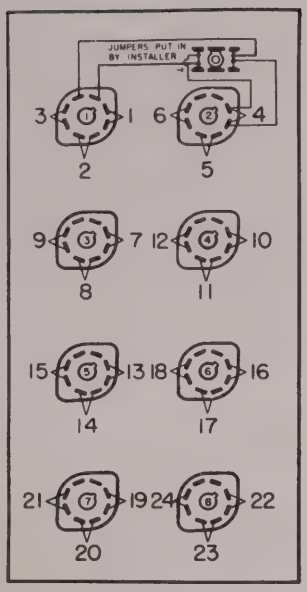


FIGURE 1

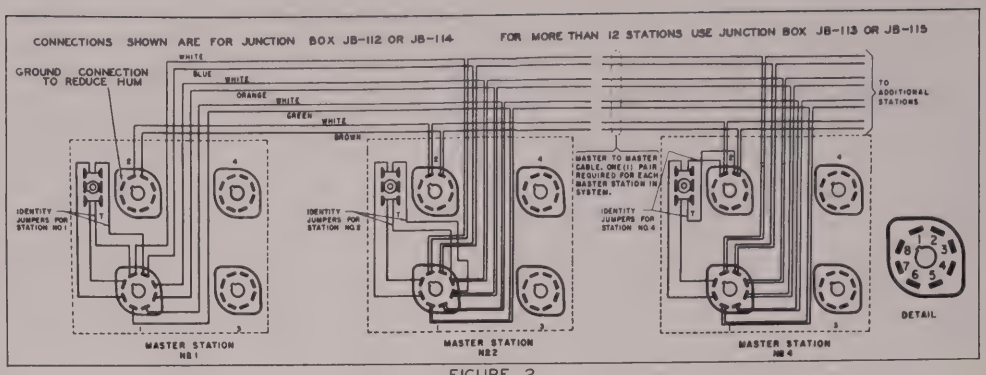
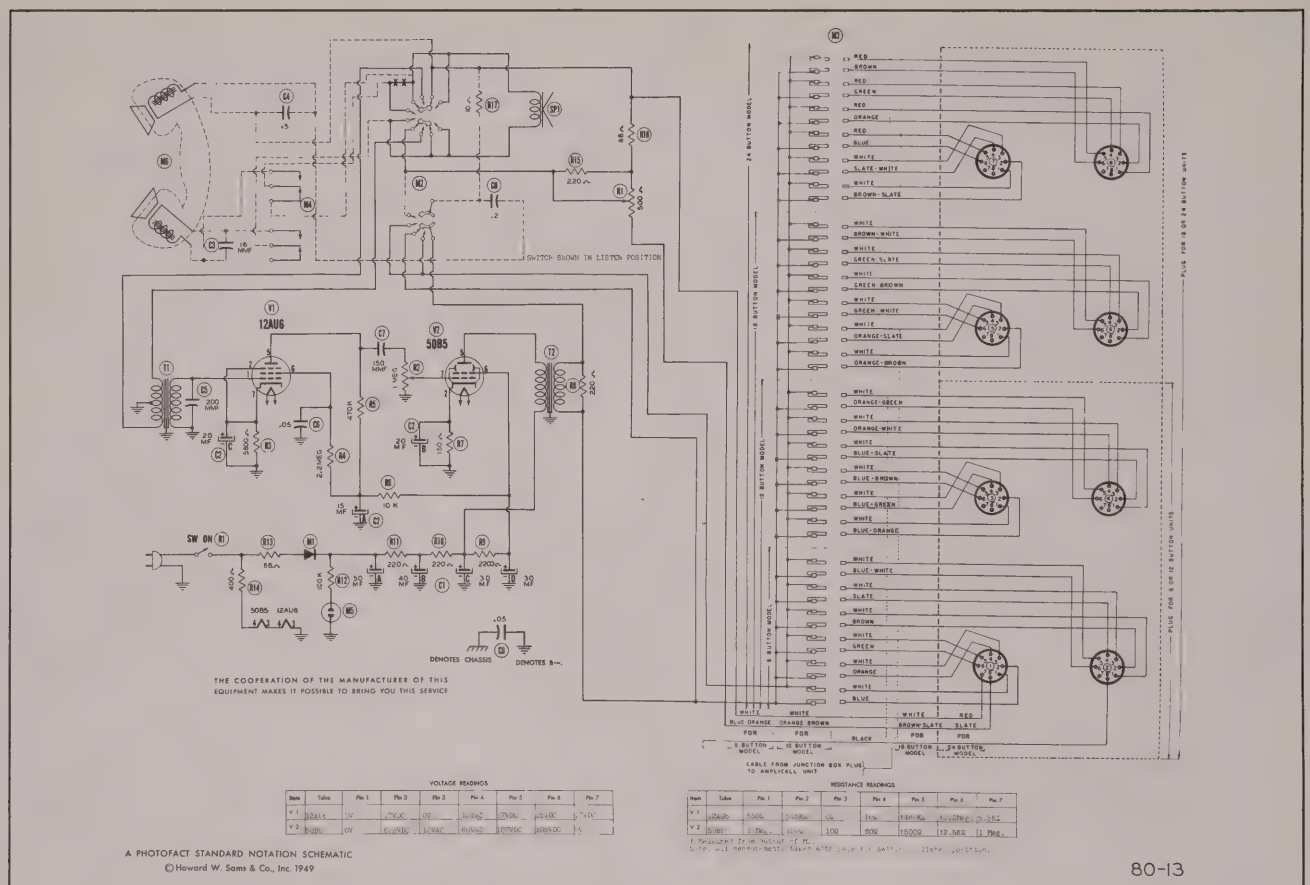


FIGURE 2

Pair No.	Color	Socket No.	Lug No.	Pair No.	Color	Socket No.	Lug No.	Pair No.	Color	Socket No.	Lug No.	Pair No.	Color	Socket No.	Lug No.
1	Blue - White	1	1 & 2	7	Blue Orange - White	3	1 & 2	13	Orange Brown - White	5	1 & 2	19	Brown Slate - White	7	1 & 2
2	Orange - White	1	3 & 4	8	Blue Green - White	3	3 & 4	14	Orange Slate - White	5	3 & 4	20	Slate White - White	7	3 & 4
3	Green - White	1	5 & 6	9	Blue Brown - White	3	5 & 6	15	Green White - White	5	5 & 6	21	Blue - Red	7	5 & 6
Spkr Identity pair		1	7 & 8	-	No connection	3	7 & 8	-	No connection	5	7 & 8	-	No connection	7	7 & 8
4	Brown - White	2	1 & 2	10	Blue Slate - White	4	1 & 2	16	Green Brown - White	6	1 & 2	22	Orange - Red	8	1 & 2
5	Slate - White	2	3 & 4	11	Orange White - White	4	3 & 4	17	Green Slate - White	6	3 & 4	23	Green - Red	8	3 & 4
6	Blue White - White	2	5 & 6	12	Orange Green - White	4	5 & 6	18	Brown White - White	6	5 & 6	24	Brown - Red	8	5 & 6
Gnd	No cable connection	2	8	-	No connection	4	7 & 8	-	No Connection	6	7 & 8	-	No Connection	8	7 & 8


SWITCH SHOWN IN LISTEN POSITION
V1 12AU6
V2 50B5
SW ON
50B5 12AU6
DENOTES CHASSIS
DENOTES B+
THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
24 BUTTON MODEL
18 BUTTON MODEL
12 BUTTON MODEL
8 BUTTON MODEL
PLUG FOR 8 OR 24 BUTTON UNITS
PLUG FOR 6 OR 12 BUTTON UNITS
CABLE FROM JUNCTION BOX PLUG TO AMPLICALL UNIT
VOLTAGE READINGS
RESISTANCE READINGS
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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80-13

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

REGAL MODELS
16T31, 1030, 1031, 1230

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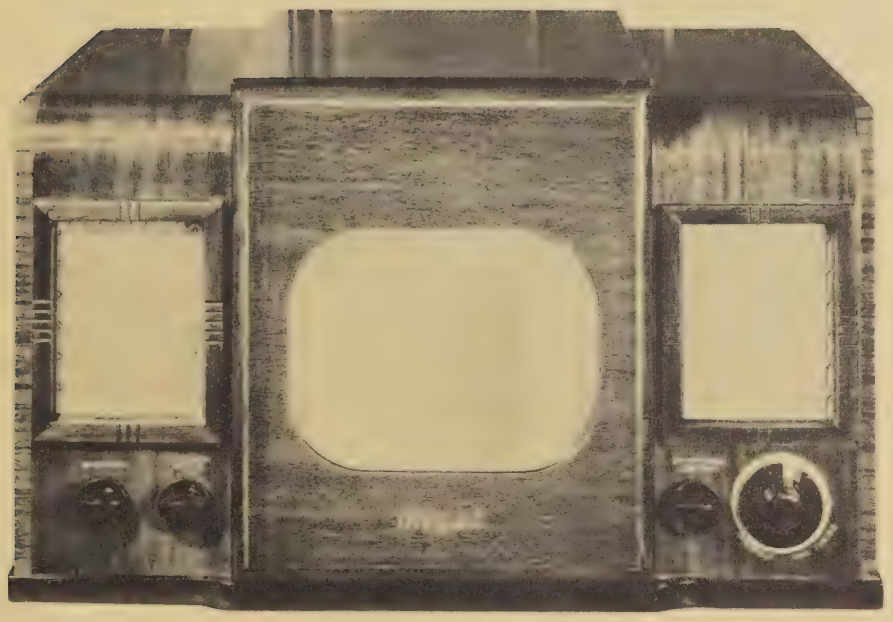

MODEL 1230

REGAL MODELS
16T31, 1030, 1031, 1230

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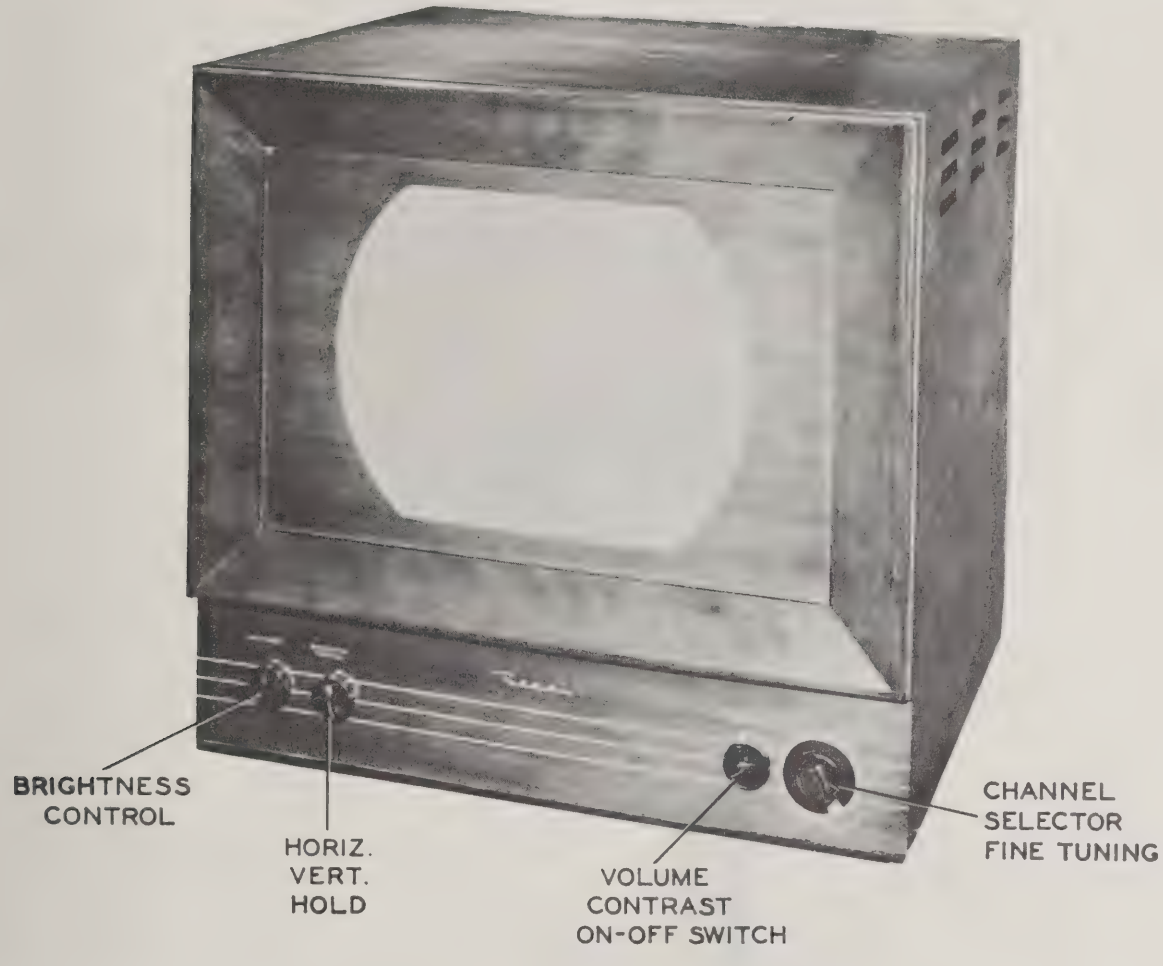
REGAL MODELS 16T31, 1030, 1031, 1230



REGAL MODELS 16T31, 1030, 1031, 1230

REGAL MODEL 16T31

TRADE NAME	Regal, Models 16T31, 1030, 1031, 1230
MANUFACTURER	Regal Electronics Corp., 605 W. 130th St., New York, New York
TYPE SET	Television Receiver
TUBES	Thirty One
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 2.5 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13

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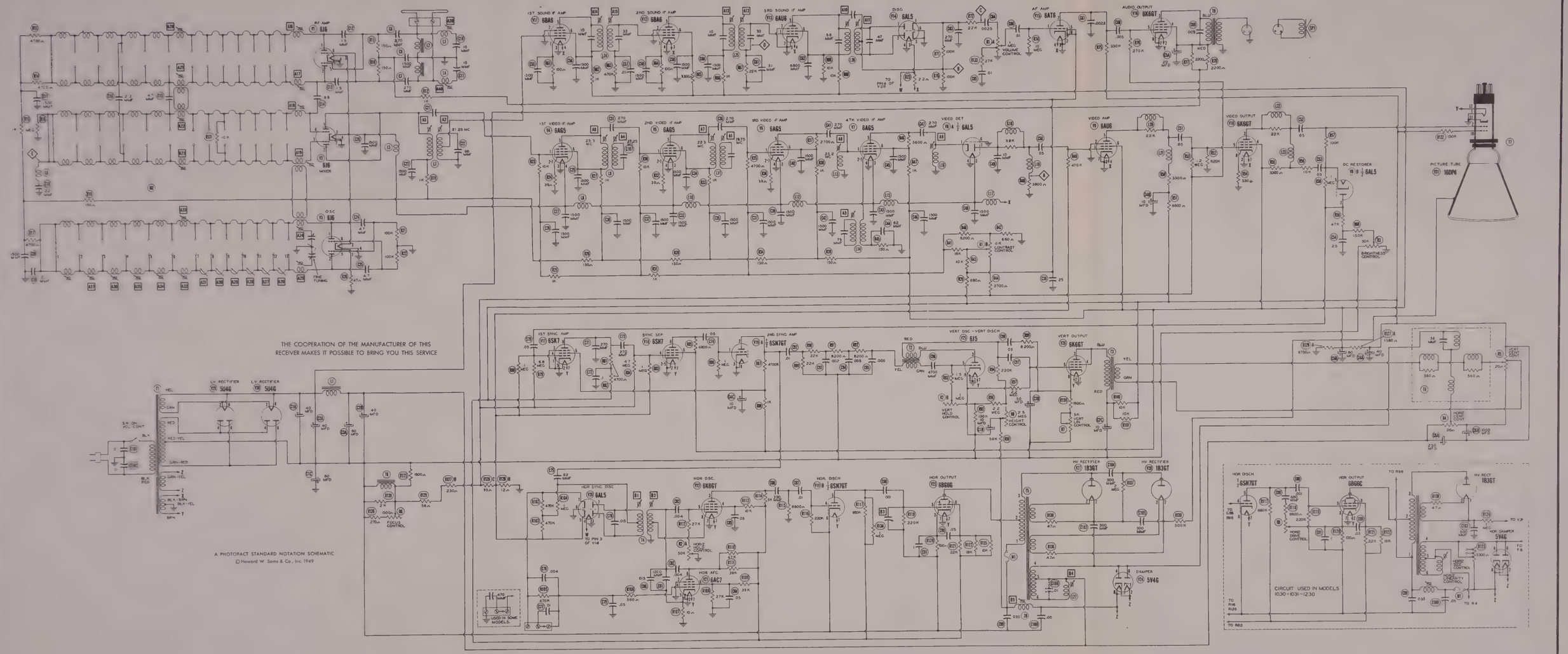
DATE 12/49 SET #80 FOLDER #14


THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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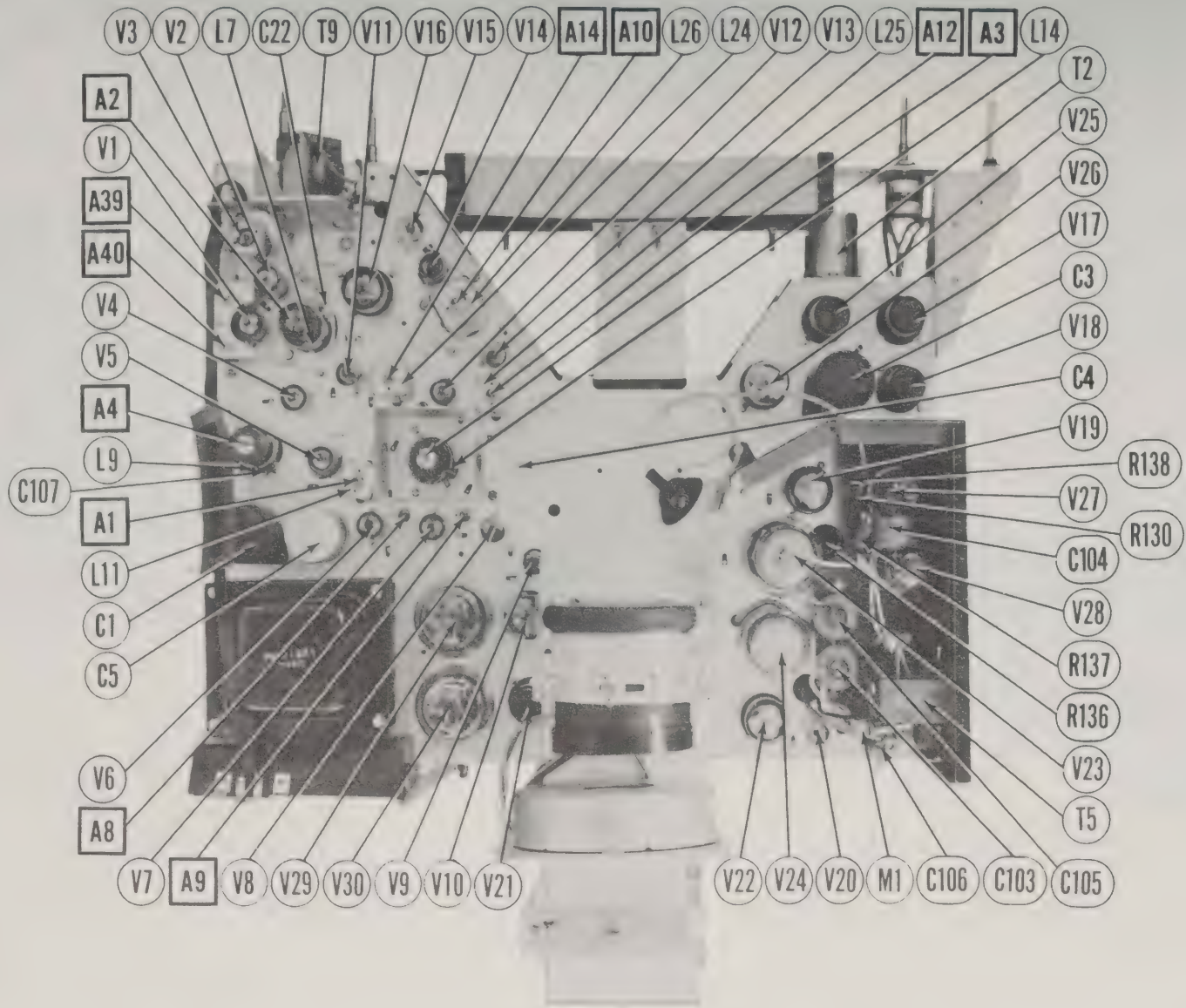
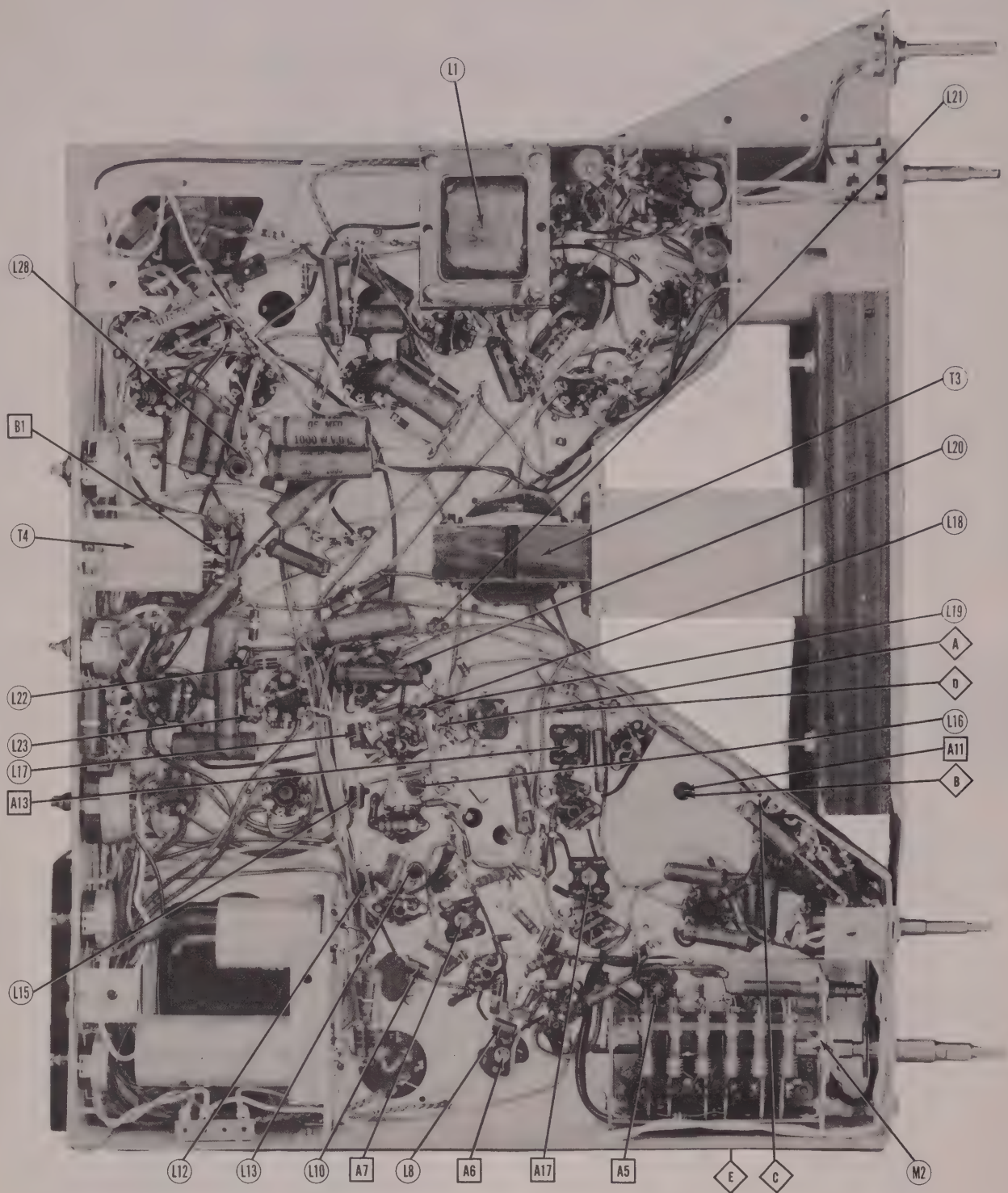
CIRCUIT USED IN MODELS 1030-1031-1230
USED IN SOME MODELS
PICTURE TUBE 16DP4
1ST SOUND IF AMP 6BA6
2ND SOUND IF AMP 6BA6
3RD SOUND IF AMP 6AU6
DISC 6AL5
AF AMP 6AT6
AUDIO OUTPUT 6K6GT
1ST VIDEO IF AMP 6AG5
2ND VIDEO IF AMP 6AG5
3RD VIDEO IF AMP 6AG5
4TH VIDEO IF AMP 6AG5
VIDEO DET 1/2 6AL5
VIDEO AMP 6AU6
VIDEO OUTPUT 6K6GT
DC RESTORER 1/2 6AL5
RF AMP 6J6
MIXER 6J6
OSC 6J6
1ST SYNC AMP 6SK7
SYNC SEP 6SH7
2ND SYNC AMP 1/2 6SN7GT
VERT OSC - VERT DISCH 6J5
VERT OUTPUT 6K6GT
LV RECTIFIER 5U4G
LV RECTIFIER 5U4G
HV RECTIFIER 1B3GT
HV RECTIFIER 1B3GT
HOR SYNC DISC 6AL5
HOR OSC. 6K6GT
HOR DISCH 1/2 6SN7GT
HOR OUTPUT 6B6G
DAMPER 5Y4G
HOR AFC 6AC7
HOR DISCH 6SN7GT
HOR OUTPUT 6B6G
HV RECT 1B3GT
HOR DAMPER 5Y4G

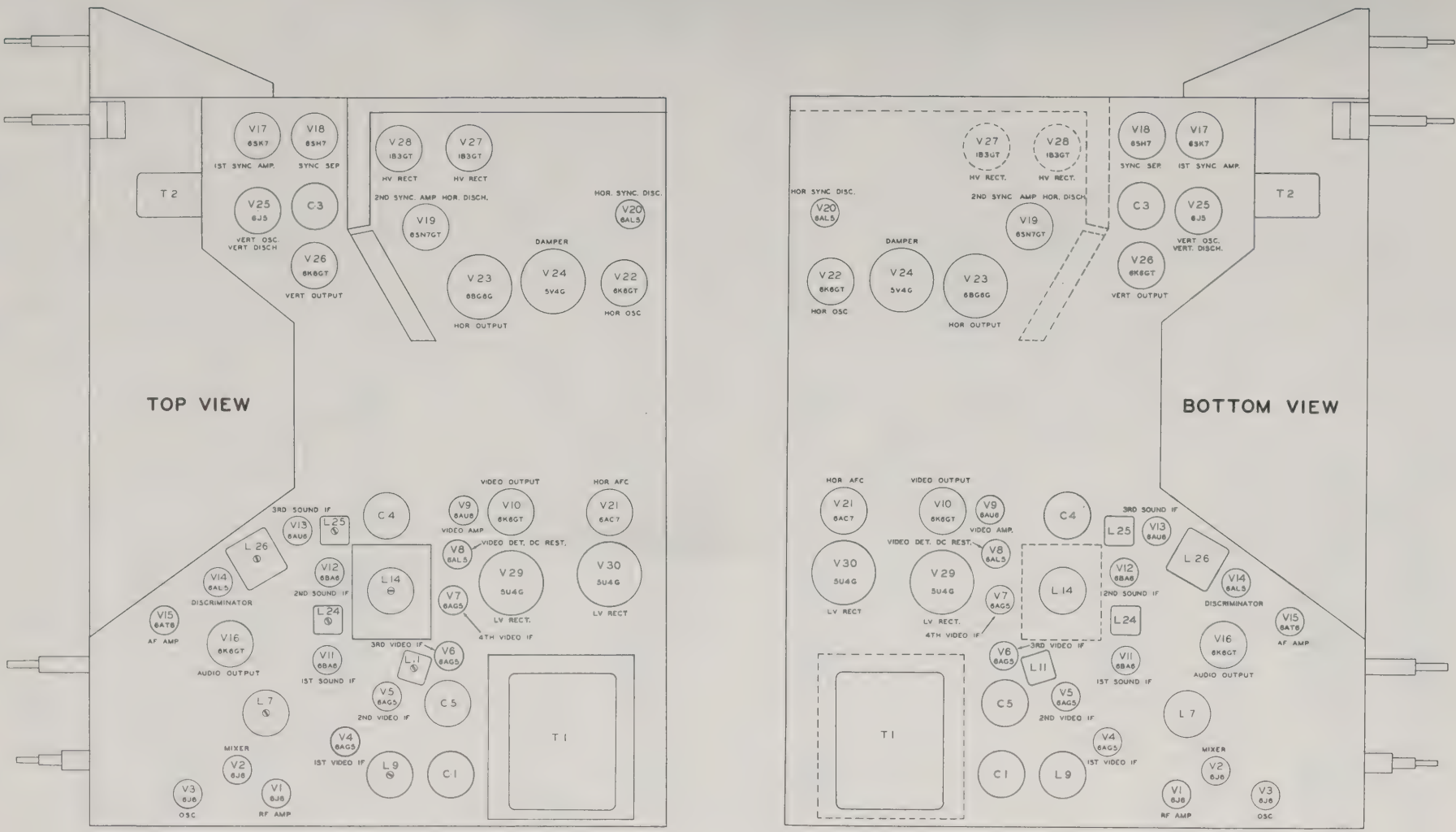
REGAL MODELS
16T31, 1030, 1031, 1230



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



TUBE PLACEMENT CHART

REGAL MODELS
1613, 1030, 1031, 1230

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If alignment is performed with picture tube removed, remove V22 from its socket to disable the high voltage supply.

The oscillator tube (V3) should be removed when performing IF adjustments. Use insulated alignment screwdriver for adjusting.

VIDEO IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.				9	DC Probe to junction of R40 and R41. Common to chassis.		Set contrast control to give a -3 volt reading. Leave at this setting during entire IF Alignment procedure.
2.	Direct	High side to ungrounded tube shield floating over mixer tube V2. Low side to chassis.	19.75MC (Unmod.)	9	DC Probe to Point (A) Common to chassis.	A1	Adjust for MINIMUM deflection.
3.	Direct	"	21.25MC	9	"	A2	"
4.	Direct	"	21.25MC	9	"	A3	"
5.	Direct	"	27.25MC	9	"	A4	"
6.	Direct	"	21.8MC	9	"	A5	Adjust for maximum deflection.
7.	Direct	"	25.3MC	9	"	A6	"
8.	Direct	"	22.3MC	9	"	A7	"
9.	Direct	"	25.2MC	9	"	A8	"
10.	Direct	"	23.4MC	9	"	A9	Adjust for maximum deflection. If A7 required adjustment in Step 8 repeat Step 2. If FM signal generator is not available continue with step 12.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal amplifier in the scope for horizontal deflection.

The waveforms shown may be inverted depending on the number of amplifying stages in the vertical amplifier in the scope being used.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Direct	High side to ungrounded tube shield floating over mixer tube V2. Low side to chassis.	24MC (10MC Sweep)	See Fig. 4.	9	Vert. Amp. to Point (A) Ground to chassis.	A5,A6, A7,A8, A9	Check for response curve per Fig.4. Make slight adjustments if necessary for optimum response. If considerable adjustment is required the traps must be realigned.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Do not remove the shield covering the discriminator tube socket during Step 12. Fashion hook on 1 Megohms resistor and make connection to Point B through alignment hole in shield.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	5000MMF	High side to pin #1 of 3rd Sound IF (V13). Low side to chassis.	21.25MC (Unmod.)	9	DC Probe to Point (B) in series with 1 Meg. Common to chassis.	A10	Detune A11. Adjust A10 for maximum deflection.
13.	5000MMF	"	"	9	DC Probe to Point (C) Common to chassis.	A11	Adjust for zero reading. A positive and negative reading is obtained on either side of the correct setting.
14.	5000MMF	High side to pin #1 of 2nd Sound IF (V12). Low side to chassis.	"	9	DC Probe to Point (D) Common to chassis.	A12,A13	Adjust for maximum deflection.
15.	5000MMF	High side to tap on trap winding of L7. Low side to chassis.	"	9	"	A14,A15	"

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	5000MMF	High side to pin 1 of 3rd Sound IF (V13). Low side to chassis.	21.25MC (600KC Sweep)	21.25MC	9	Vert. Amp. to Point (C) Low side to chassis.	A10, A11	Adjust A11 so marker occurs at the center of the diagonal line per Fig. 1. Adjust A10 for maximum amplitude and straightness of diagonal line.
13.	5000MMF	High side to pin 1 of 2nd Sound IF (V12). Low side to chassis.	"	"	"	Vert. Amp. to Point (D) in series with 33KΩ. Low side to chassis.	A12, A13	Adjust for maximum amplitude and symmetry per Fig. 2.
14.	5000MMF	High side to tap on trap winding of L7. Low side to chassis.	"	"	"	"	A14, A15	Adjust for maximum amplitude and symmetry per Fig. 3. Continue with step 16.

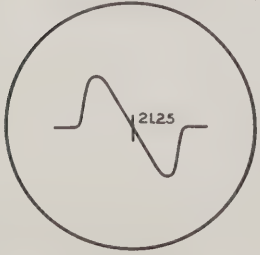


FIG. 1

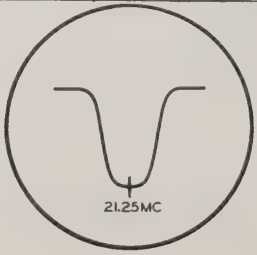


FIG. 2

FIG. 3

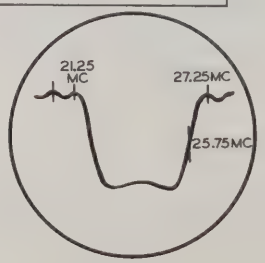


FIG. 4

ALIGNMENT INSTRUCTIONS (CONT.)

RF & MIXER ALIGNMENT

The signal generator output should be terminated with a resistance equal to its output impedance (usually 50 ohms). These adjustments are usually very stable and alignment should not be attempted unless they are known to be out of alignment.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	120Ω carbon res. in series with each lead.	To ant. terminals.	213MC (10MC Sweep)	211.25MC 215.75MC	13	Vert. Amp. to Point E in series with 10KΩ. Low side to chassis.	A16, A17, A18, A19	Adjust for approx. flat top response per Fig. 5 with markers above 70%.
17.	"	"	207MC (10MC Sweep)	205.25MC 209.75MC	12	"		Check for response curve per Fig. 5.
			201MC (10MC Sweep)	199.25MC 203.75MC	11			
			195MC (10MC Sweep)	193.25MC 197.75MC	10			
			189MC (10MC Sweep)	187.25MC 191.75MC	9			
			183MC (10MC Sweep)	181.25MC 185.75MC	8			
			177MC (10MC Sweep)	175.25MC 179.75MC	7			

If markers are below 70% on any channel make slight adjustment of A16, A17, A18 and A19 with channel selector on that channel. Recheck the other high band channels.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18.	120Ω carbon res. in series with each lead.	To ant. terminals.	85MC (10MC Sweep)	83.25MC 87.75MC	6	Vert. Amp. to Point E in series with 10KΩ. Low side to chassis.	A20, A21, A22, A23	Adjust for approx. flat top response per Fig. 5 with markers above 70%.
19.	"	"	79MC (10MC Sweep)	77.25MC 81.75MC	5	"		Check for response curve per Fig. 5.
			69MC (10MC Sweep)	67.25MC 71.75MC	4			
			63MC (10MC Sweep)	61.25MC 65.75MC	3			
			57MC (10MC Sweep)	55.25MC 59.75MC	2			

If markers are below 70% on any channel make slight adjustments of A20, A21, A22 and A23 with channel selector on that channel. Recheck the other low band channels.

OSCILLATOR ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
20.	2-120Ω carbon res.	To antenna terminals.	215.75MC (Unmod.)	13	DC Probe to Point C Common to chassis.	A24,A25	Adjust for zero reading. A positive and negative reading is obtained on either side of the correct setting. Keep A24 and A25 slugs at approximately the same relative setting.
21.	"	"	209.75MC	12	"	A26	Adjust for zero reading as above.
			203.75MC	11		A27	
			197.75MC	10		A28	
			191.75MC	9		A29	
			185.75MC	8		A30	
			179.75MC	7		A31	
A22.	"	"	87.75MC	6	"	A32,A33	Adjust for zero reading keeping A32 and A33 slugs at approximately the same relative position.
A23.	"	"	81.75MC	5	"	A34	Adjust for zero reading.
			71.75MC	4		A35	
			65.75MC	3		A36	
			59.75MC	2		A37	

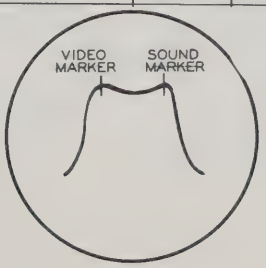
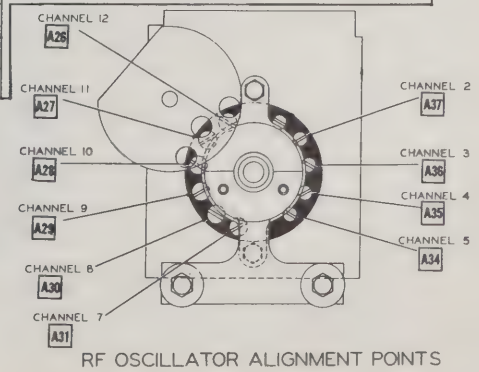


FIG. 5



RF OSCILLATOR ALIGNMENT POINTS

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	50VDC	50VDC	6.3VAC	0V	-.1VDC	-.1VDC	0V		
V 2	6J6	90VDC	90VDC	6.3VAC	0V	-1.7VDC	-1.7VDC	0V		
V 3	6J6	55VDC	55VDC	6.3VAC	0V	§ -2.8VDC	§ -2.2VDC	.2VDC		
V 4	6AG5	-.5VDC	.2VDC	0V	6.3VAC	87VDC	87VDC	.2VDC		
V 5	6AG5	-.8VDC	.3VDC	6.3VAC	0V	87VDC	87VDC	.3VDC		
V 6	6AG5	-.8VDC	.2VDC	6.3VAC	0V	83VDC	92VDC	.2VDC		
V 7	6AG5	0V	1VDC	6.3VAC	0V	65VDC	100VDC	1VDC		
V 8	6AL5	0V	-105VDC	6.3VAC	0V	-87VDC	0V	-5.4VDC		
V 9	6AU6	-.8VDC	0V	0V	6.3VAC	225VDC	100VDC	0V		
V 10	6K6GT	0V	0V	80VDC	100VDC	-2.7VDC	0V	6.3VAC	2.8VDC	
V 11	6BA6	0V	0V	0V	6.3VAC	90VDC	90VDC	1.1VDC		
V 12	6BA6	0V	0V	6.3VAC	0V	95VDC	93VDC	1.1VDC		
V 13	6AU6	-.4VDC	0V	0V	6.3VAC	37VDC	37VDC	0V		
V 14	6AL5	0V	-.2VDC	6.3VAC	0V	0V	0V	-.2VDC		
V 15	6AT6	-.3VDC	0V	0V	6.3VAC	.1VDC	.1VDC	65VDC		
V 16	6K6GT	0V	6.3VAC	215VDC	230VDC	-7.3VDC	0V	0V	0V	
V 17	6SK7	0V	0V	0V	-.7VDC	0V	95VDC	6.3VAC	160VDC	
V 18	6SH7	0V	0V	0V	-1.4VDC	0V	100VDC	6.3VAC	100VDC	
V 19	6SN7GT	-.8VDC	67VDC	0V	#-35VDC	#0V	#0V	6.3VAC	0V	
V 20	6AL5	-1VDC	-4.4VDC	0V	6.3VAC	-2VDC	0V	-4.4VDC		
V 21	6AC7	0V	0V	0V	-1.1VDC	.1VDC	90VDC	6.3VAC	157VDC	
V 22	6K6GT	0V	0V	170VDC	187VDC	-25VDC	315VDC	6.3VAC	.2VDC	
V 23	6BG6G	0V	6.3VAC	#12VDC	0V	#0V	0V	0V	#290VDC	TOP CAP *
V 24	5V4G	0V	325VDC	0V	240VDC	0V	240VDC	250VDC	325VDC	
V 25	6J5	0V	0V	#110VDC #330VDC	#0V	# -100VDC	#-25VDC	6.3VAC	#0V	
V 26	6K6GT	0V	6.3VAC	#310VDC	#310VDC	#0V	#.3VDC #40VDC	0V	#25VDC #50VDC	
V 27	1B3GT	* DO NOT MEASURE								
V 28	1B3GT									
V 29	5U4G	0V	365VDC	0V	355VAC	0V	355VAC	0V	365VDC	
V 30	5U4G	0V	365VDC	0V	355VAC	0V	355VAC	0V	365VDC	
V31	16DP4	0V	.7VDC	PIN 10 340VDC	PIN 11 110VDC	PIN 12 6.3VAC				

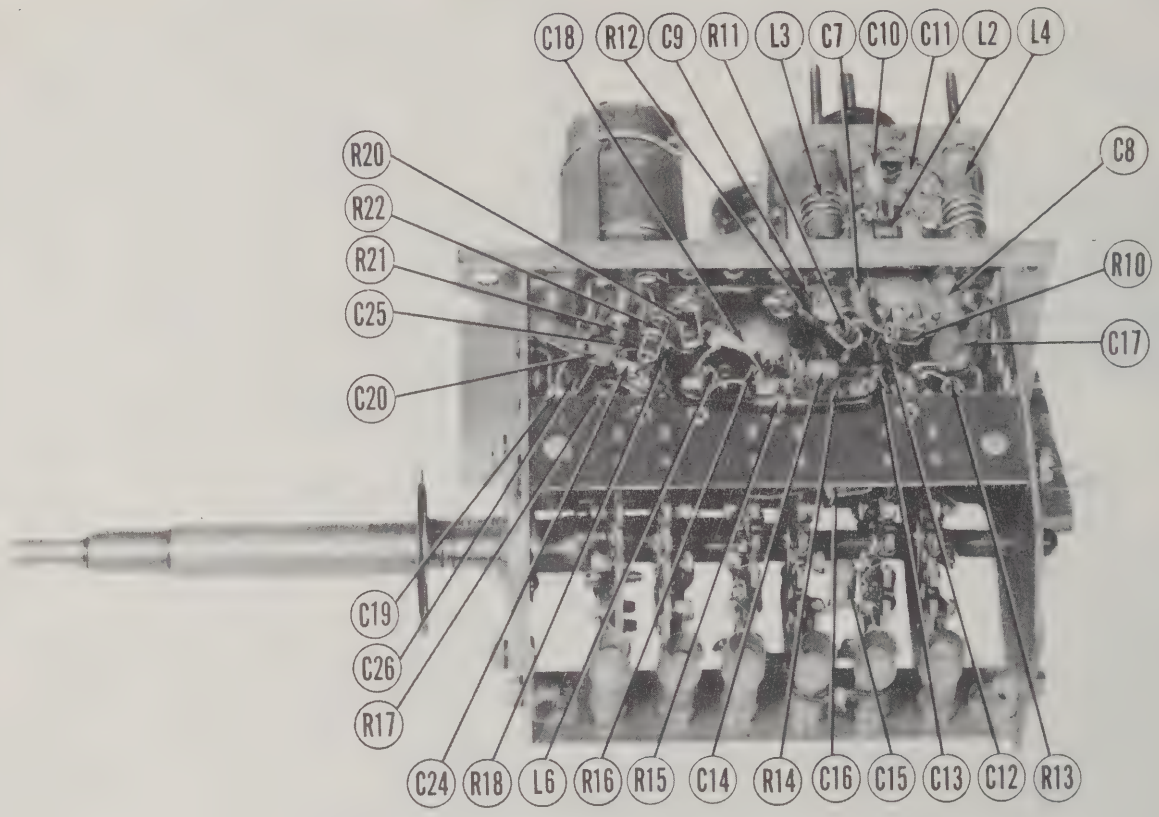
Note: Contrast control set at maximum for these measurements.
§ Taken with vacuum tube voltmeter.
* Do not measure
# Measured from pin 8 of V25.

RESISTANCE READINGS

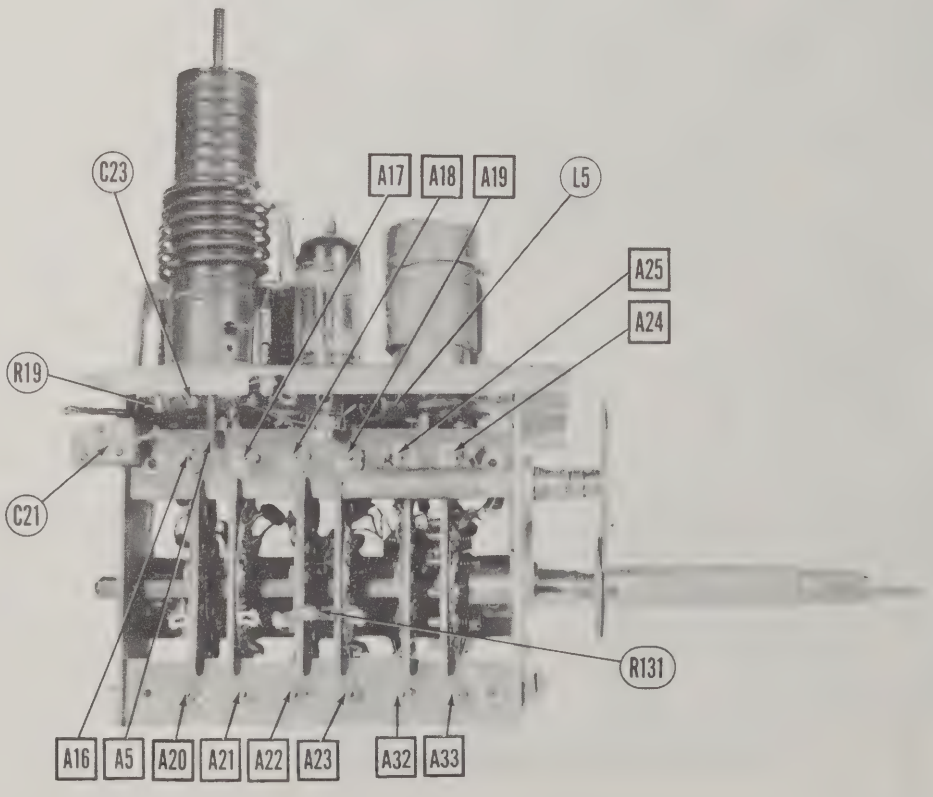
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	†6KΩ	†6KΩ	.1Ω	0Ω	12KΩ	12KΩ	0Ω		
V 2	6J6	†3KΩ	†3KΩ	.1Ω	0Ω	1 Meg.	1 Meg.	0Ω		
V 3	6J6	†6.8KΩ	†6.8KΩ	.1Ω	0Ω	100KΩ	100KΩ	47Ω		
V 4	6AG5	17KΩ	39Ω	0Ω	.1Ω	†3KΩ	†3KΩ	39Ω		
V 5	6AG5	17KΩ	39Ω	.1Ω	0Ω	†3KΩ	†3KΩ	39Ω		
V 6	6AG5	11KΩ	39Ω	.1Ω	0Ω	†5KΩ	†2.5KΩ	39Ω		
V 7	6AG5	.2Ω	150Ω	.1Ω	0Ω	†8KΩ	†2.5KΩ	150Ω		
V 8	6AL5	.2Ω	200KΩ	.1Ω	0Ω	1.2Meg.	0Ω	4KΩ		
V 9	6AU6	470KΩ	0Ω	0Ω	.1Ω	†10KΩ	†1.5KΩ	0Ω		
V 10	6K6GT	0Ω	0Ω	†4.5KΩ	†1.5KΩ	550KΩ	Inf.	.1Ω	330Ω	
V 11	6BA6	.2Ω	0Ω	0Ω	.1Ω	†2.5KΩ	†2.5KΩ	100Ω		
V 12	6BA6	470KΩ	0Ω	.1Ω	0Ω	†2.5KΩ	†4.5KΩ	100Ω		
V 13	6AU6	22KΩ	0Ω	0Ω	.1Ω	†7KΩ	†7KΩ	0Ω		
V 14	6AL5	200KΩ	100KΩ	.1Ω	0Ω	0Ω	0Ω	100KΩ		
V 15	6AT6	10 Meg.	0Ω	0Ω	.1Ω	10KΩ	10KΩ	†330KΩ		
V 16	6K6GT	Inf.	.1Ω	†1.5KΩ	†1000Ω	270KΩ	250KΩ	0Ω	0Ω	
V 17	6SK7	0Ω	0Ω	0Ω	1 Meg.	0Ω	†2.2KΩ	.1Ω	†9.5KΩ	
V 18	6SH7	0Ω	0Ω	0Ω	1 Meg.	0Ω	†1.5KΩ	.1Ω	†10KΩ	
V 19	6SN7GT	1 Meg.	†7KΩ	0Ω	220KΩ	†680KΩ	#0Ω	.1Ω	0Ω	
V 20	6AL5	1 Meg.	1.5Meg.	0Ω	.1Ω	12Ω	0Ω	1.5Meg.		
V 21	6AC7	0Ω	0Ω	0Ω	1.5Meg.	10Ω	†20KΩ	.1Ω	†22KΩ	
V 22	6K6GT	Inf.	0Ω	†5KΩ	†10KΩ	80KΩ	♦36Ω	.1Ω	10Ω	
V 23	6BG6G	Inf.	.1Ω	#100Ω	Inf.	220KΩ	Inf.	0Ω	†6KΩ	TOP CAP ♦120Ω
V 24	5V4G	Inf.	400KΩ	Inf.	†60Ω	Inf.	†60Ω	†0Ω	400KΩ	
V 25	6J5	0Ω	0Ω	♦1.5Meg. ♦280KΩ	65KΩ	2.6Meg.	1 Meg.	.1Ω	#0Ω	
V 26	6K6GT	Inf.	.1Ω	†5KΩ	†5KΩ	2.2Meg.	6KΩ 600Ω	0Ω	7KΩ 2KΩ	
V 27	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ♦195Ω
V 28	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ♦ Inf.
V 29	5U4G	Inf.	5.5KΩ	Inf.	650Ω	Inf.	650Ω	Inf.	5.5KΩ	
V 30	5U4G	Inf.	5.5KΩ	Inf.	650Ω	Inf.	650Ω	Inf.	5.5KΩ	
V31	16DP4	0Ω	1.3Meg.	PIN 10 †150KΩ	PIN 11 0Ω	PIN 12 .1Ω				

† Measured from pin 8 of V29
♦ Measured from pin 8 of V24
Measured from pin 8 of V25

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: REGAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6J6	6J6	7BF	
V2	Mixer	6J6	6J6	7BF	
V3	Oscillator	6J6	6J6	7BF	
V4	1st Video IF	6AG5	6AG5	7BD	
V5	2nd Video IF	6AG5	6AG5	7BD	
V6	3rd Video IF	6AG5	6AG5	7BD	
V7	4th Video IF	6AG5	6AG5	7BD	
V8	Video Det.-DC Restorer	6AL5	6AL5	6BT	
V9	Video Amp.	6AU6	6AU6	7BK	
V10	Video Output	6K6GT	6K6GT	7S	
V11	1st Sound IF	6BA6	6BA6	7BK	
V12	2nd Sound IF	6BA6	6BA6	7BK	
V13	3rd Sound IF	6AU6	6AU6	7BK	
V14	Disc.	6AL5	6AL5	6BT	
V15	AF Amp.	6AT6	6AT6	7BT	
V16	Audio Output	6K6GT	6K6GT	7S	
V17	1st Sync. Amp.	6SK7	6SK7	8N	
V18	Sync. Sep.	6SH7	6SH7	8BK	
V19	2nd Sync. Amp.-Hor. Disch.	6SN7GT	6SN7GT	8BD	
V20	Hor. Sync. Disc	6AL5	6AL5	6BT	
V21	Hor. AFC	6AC7	6AC7	8N	
V22	Hor. Osc.	6K6GT	6K6GT	7S	
V23	Hor. Output	6BG6G	6BG6G	5BT	
V24	Damper	5V4G	5V4G	5L	
V25	Vert. Osc.-Vert. Disch.	6J5	6J5	6Q	
V26	Vert. Output	6K6GT	6K6GT	7S	
V27	HV Rectifier	1B3GT	1B3GT	3C	
V28	HV Rectifier	1B3GT	1B3GT	3C	
V29	LV Rectifier	5U4G	5U4G	5T	
V30	LV Rectifier	5U4G	5U4G	5T	
V31A	Picture Tube	16DP4	16DP4	12D	
B	Picture Tube	10BP4	10BP4	12D	
C	Picture Tube	12LP4	12LP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: REGAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450		AFH82J16D	UP9CJ729		TVL-25	◓ Filter
B	10	450						■ Decoupling
C	80	150						▲ Bias Filter
C2A	40	450		AFH882J	UP9CJ897		TVL-54	◓ Filter
B	40	450						■ Filter
C	10	450						▲ Vert. Output Plate Dec.
C3A	80	450		AFH16J10B	UP9BJ730		TVL-18	◓ Filter
B	50	50						▲ Vert. Output Cath.
C4A	40	450		AFH82J2H	UP9CJ731		TVL-53	◓ Filter
B	10	450						■ Low Pass Filter
C	10	350						▲ Decoupling
C5A	20	450		AFH4J16H	UP9BJ337		TVL-16	◓ Audio Output Dec.
B	80	350						▲ Filter
C6A	250	10		PRS12/250	UP7BJ808		TVL-66	■ Hor. Cent. Cont. Bypass
B	1000	6		PRS6/1000				▲ Vert. Cent. Cont. Bypass
C7	270					GP2K-270		Ant. Coupling
C8	270					GP2K-270		Ant. Coupling
C9	1500					GP2L-0015		Bias Filter
C10	10					NPOK-10		Fixed Trimmer
C11	10					NPOK-10		Fixed Trimmer
C12	1.5					NPOK-1.5		Neutralizing
C13	1.5					NPOK-1.5		Neutralizing
C14	.68							RF Coupling
C15	4.7					NPOK-4.7		RF Coupling
C16	2.2							RF Coupling
C17	1500					GP2L-0015		RF Decoupling
C18	22					GP1K-22		Fixed Trimmer
C19	10					NPOK-10		Fixed Trimmer
C20	1500					GP2L-0015		RF Decoupling
C21	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C22	68							Fixed Trimmer
C23	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	Mixer Decoupling
C24	4.7					NPOK-4.7		Osc. Feedback
C25	4.7					NPOK-4.7		Osc. Feedback
C26	1500					GP2L-0015		Filament Bypass
C27	1500					GP2L-0015		Filament Bypass
C28	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	Bias Filter
C29	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Decoupling
C30	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C31	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	V. IF Coupling
C32	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	Bias Filter
C33	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Fil. Bypass
C34	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Decoupling
C35	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C36	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	V. IF Coupling
C37	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	Bias Filter
C38	.25	400		P488-25	GT4P25		TC-2	Bias Filter
C39	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Fil. Bypass
C40	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C41	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	V. IF Coupling
C42	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C43	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Fil. Bypass
C44	82			1468-0001	5W5T1	GP1K-100	1FM-31	4th V. IF Cath. Bypass
C45	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Decoupling
C46	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C47	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	V. IF Decoupling
C48	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	V. Det. Fil. Bypass
C49	10	500		1468-00001	5W5T1	GP1K-10	MS-41	V. Diode Filter

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA REGAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C50	.05	400		P488-05	DT4S5		TM-15	Video Coupling
C51	.05	600		P688-05	DT5S5		TM-15	Video Coupling
C52	.05	600		P688-05	DT5S5		TM-15	Video Coupling
C53	.05	400		P488-05	DT4S5		TM-15	Video Coupling
C54	.25	400		P488-25	DT4P25		TC-2	Bias Filter
C55	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Cath. Bypass
C56	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Decoupling
C57	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	2nd S. IF Grid Filter
C58	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Cath. Bypass
C59	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Screen Bypass
C60	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Plate Dec.
C61	51			1468-00005	5W545	GP1K-50	1FM-45	3rd S. IF Grid Filter
C62	6800	500		1467-008	1D3D7	GP2-334-0068	1FM-27	3rd S. IF Dec.
C63	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	RF Bypass
C64	.0025	600		P688-0022	DT6D2	GP2M-0025	TM-22	Audio Coupling
C65	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	Tone Comp.
C66	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	Audio Coupling
C67	.0025	600		P688-0022	DT6D25	GP2M-0025		De-emphasis
C68	.005	600		P688-005	DT6D5	GP2M-005	TM-25	Audio Coupling
C69	.005	600		P688-005	DT6D5	GP2M-005	TM-25	Output Plate Bypass
C70	.05	600		P688-05	DT6S5		TM-15	Sync. Coupling
C71	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	1st Sync. Amp. Plate
C72	.1	500		P688-1	DT6P1		TM-1	1st Sync. Amp. Plate Dec.
C73	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	Sync. Coupling
C74	.05	600		P688-05	DT6S5		TM-15	Sync. Coupling
C75	82	500						Hor. Sync. Coupling
C76	.004	1000		P1068-004	DT16D4		MB-24	AFC Filter
C77	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	AFC Filter ‡
C78	.015	400		P488-015	DT6S15		MB-115	Fixed Trimmer
C79	.05	400		P488-05	DT4S5		TM-15	AFC Filter
C80	.015	400		P488-015	DT6S15		MB-115	Phase Shifter
C81	1200							Phase Shifter
C82	.004	1000		P1068-004	DT16D4		MB-24	AFC Coupling
C83	.004	1000		P1068-004	DT16D4		MB-24	Hor. Osc. Grid
C84	.05	600		P688-05	DT6S5		TM-15	H. Osc. Contr. Screen
C85	.05	600		P688-05	DT6S5		TM-15	Hor. Osc. Screen
C86	390	500		1468-0004	5W5T4	GP2K-390	1FM-34	Differentiator Net.
C87	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	Hor. Sweep Coupling
C88	.001	1000		P1068-001	DT16D1		TM-21	Hor. Sweep Coupling
C89	680	500				GP2K-680		Hor. Discharge *
C90	.05	600		P688-05	DT6S5		TM-15	Hor. Output Screen
C91	.1	600		P688-1	DT6P1		TM-1	Hor. Output Cath.
C92	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	Vert. Sync. Coupling
C93	.002	600		P688-002	DT6D2	GP2M-002	TM-22	Integrator Net.
C94	.005	400		P688-005	DT6D5	GP2M-005	TM-25	Integrator Net.
C95	.005	400		P688-005	DT6D5	GP2M-005	TM-25	Integrator Net.
C96	4700	500		1467-005	1D5D5	GP2M-0047	1FM-25	Vert. Osc. Grid
C97	.1	400		P488-1	DT4P1		TM-1	Vert. Sweep Coupling
C98	.05	600		P688-05	DT6S5		TM-15	Vert. Discharge
C99	.035	1000		P1088-033				Damper Filter
C100	.05	1000		P1088-05	DT16S5		TR-15	Damper Filter †
C101	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	Line Filter
C102	.01	400		P488-01	DT4S1	GP2-335-01	TM-11	Line Filter
C103	600	10000				410-500		HV Filter
C104	500	10000				410-500		Voltage Doubler Cap. #
C105	500	10000				410-500		HV Filter #
C106	.01	600		P688-01	DT6S1	GP2-335-01	TM-11	Fixed Trimmer §
C107	43							Fixed Trimmer

* Not used in model 16T31.
‡ Maybe .01MFD in some models.
† Some models parallel C100 with an .05MFD-1000 Volt capacitor.
§ Used in some receivers where additional width is required.
# Used only in model 16T31.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA REGAL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	‡		B13-137X#	P-970111-7	Volume control, tapped ⑥ 200KΩ, rear (Dual
B	10KΩ	‡		B11-116 #		Contrast control, front Concentric)
C	Shaft End			E187 #		Attach per instructions in "Concentrikit".
D	Switch			76-1 #		Attach per instructions in "Concentrikit".
R2A	50KΩ	‡		B11-123 #	CM4994	Horiz. hold control, rear (Dual Concentric)
B	1 Meg.	‡		B11-137 #		Vert. hold control, front)
C	Shaft End			E187 #		Attach per instructions in "Concentrikit".
R3	50KΩ	‡		Q11-123	CM4993	Brightness control
R4	20Ω	2		W-20	43-20	Horiz. centering, center tap not used.
R5	20Ω	2		W-20X10	43-20CT	Vert. centering, tapped ⑥ 10Ω
R6	150Ω	4			P970111-11	Focus control
R7	500Ω	‡		Q11-114	M-19-S	Vert. linearity control
R8	2.5Meg.	‡		Q11-239	M-84-S	Height control
R9	20KΩ	‡		Q11-120	M-40-S	Horiz. drive control *

* Used in models 1030, 1031 and 1230 only.
# Additional parts to be used with "Concentrikit".

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA REGAL PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R10	150Ω 20%	‡			RF Grid
R11	150Ω 20%	‡			RF Grid
R12	1000Ω 20%	‡		BTS-1000	Bias Network

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA REGAL PART No.	IRC PART No.	IDENTIFICATION CODES
R13	4700Ω 20%	‡			RF Plate
R14	4700Ω 20%	‡			RF Plate
R15	1000Ω 20%	‡		BTS-1000	RF Decoupling
R16	1 Meg. 20%	‡			Mixer Grid
R17	4700Ω 20%	‡			Osc. Plate
R18	150Ω 20%	‡			Decoupling
R19	1000Ω 20%	‡		BTS-1000	Mixer Plate Decoupling
R20	47Ω 20%	‡			Osc. Cathode
R21	100KΩ 20%	‡			Osc. Grid
R22	100KΩ 20%	‡			Osc. Grid
R23	10KΩ	‡			1st Video IF Grid
R24	39Ω	‡			1st Video IF Cathode
R25	1000Ω 20%	‡		BTS-1000	Bias Network
R26	150Ω 20%	‡			Decoupling
R27	1000Ω 20%	‡			2nd Video IF Decoupling
R28	150Ω 20%	‡			Decoupling
R29	680KΩ	‡		BTS-680K	Voltage Divider
R30	10KΩ	‡			2nd Video IF Grid
R31	1000Ω 20%	‡		BTS-1000	Bias Network
R32	39Ω	‡			2nd Video IF Cathode
R33	1000Ω 20%	‡		BTS-1000	2nd Video IF Decoupling
R34	150Ω 20%	‡			Decoupling
R35	4700Ω	‡			3rd Video IF Grid
R36	39Ω	‡			3rd Video IF Cathode
R37	2700Ω	‡		BTS-2700	3rd Video IF Plate
R38	1000Ω 20%	‡		BTS-1000	3rd Video IF Decoupling
R39	150Ω 20%	‡			Decoupling
R40	820Ω	‡		BTS-8200	Bias Network
R41	18KΩ	‡		BTS-18K	Bias Network
R42	68Ω	‡		BTS-680	Bias Network
R43	10KΩ	‡		BTS-10K	Bias Network
R44	2700Ω	‡		BTS-2700	Bias Network
R45	150Ω 20%	‡			4th Video IF Cathode
R46	5600Ω 5%	‡			4th Video IF Plate
R47	1000Ω 20%	‡		BTS-1000	4th Video IF Decoupling
R48	3900Ω	‡		BTS-3900	Video Det. Diode Load
R49	470KΩ	‡		BTS-470K	Video Amp. Grid
R50	3300Ω	‡		BTS-3300	Video Amp. Plate
R51	680Ω	‡		BTS-680	Low Pass Filter
R52	8200Ω 5%	‡		BTS-820K-5%	Video Output Grid
R53	1.2 Meg.	‡		BTS-1.2 Meg.	Bias Network
R54	330Ω	‡		BW-½-330	Video Output Cathode
R55	3300Ω	1		BTA-3300	Video Output Plate
R56	10KΩ	‡		BTS-10K	Sync. Isolation
R57	100KΩ	‡		BTS-100K	Picture Tube Grid
R58	1 Meg.	‡		BTS-1 Meg.	DC Rest. Diode Load
R59	47KΩ	‡		BTS-47K	Voltage Divider
R60	150KΩ 20%	‡		BTS-150K	Voltage Divider
R61	100Ω	‡			1st Sound IF Cathode
R62	1000Ω 20%	‡		BTS-1000	1st Sound IF Decoupling
R63	470KΩ	‡			2nd Sound IF Grid
R64	100Ω	‡			2nd Sound IF Cathode
R65	3300Ω	‡		BTS-3300	2nd Sound IF Screen
R66	1000Ω 20%	‡		BTS-1000	2nd Sound IF Plate Decoupling
R67	22KΩ	‡			3rd Sound IF Grid
R68	10KΩ	‡		BTA-10K	3rd Sound IF Decoupling
R69	10KΩ	‡		BTS-10K	Voltage Divider
R70	100KΩ	‡		BTS-100K	Disc. Diode Load
R71	100KΩ	‡		BTS-100K	Disc. Diode Load
R72	22KΩ	‡		BTS-22K	De-emphasis
R73	2.2Ω	1		BW-1-2.2	Disc. Filament (Wire Wound)
R74	10 Meg.	‡		BTS-10 Meg.	AF Grid
R75	330KΩ	‡		BTS-330K	AF Plate
R76	270KΩ	‡		BTS-270K	Output Grid
R77	2200Ω	2		BW-2-2200	Filter
R78	2200Ω	2		BW-2-2200	Filter
R79	6.8 Meg.	‡		BTS-6.8 Meg.	Bias Network
R80	1 Meg.	‡		BTS-1 Meg.	1st Sync. Amp. Grid
R81	4700Ω 5%	1		BTA-4700-5%	1st Sync. Amp. Plate
R82	4700Ω 5%	1		BTA-4700-5%	1st Sync. Amp. Plate Decoupling
R83	1 Meg.	‡		BTS-1 Meg.	Sync. Sep. Grid
R84	4.7 Meg.	‡		BTS-4.7 Meg.	Sync. Sep. Grid Bias Network
R85	6800Ω	1		BTA-6800	Sync. Sep. Plate
R86	1 Meg.	‡		BTS-1 Meg.	2nd Sync. Amp. Grid
R87	4700Ω	‡		BTA-4700	2nd Sync. Amp. Plate
R88	1000Ω 20%	‡		BTS-1000	Decoupling
R89	22KΩ	‡		BTS-22K	Differentiator
R90	22KΩ	‡		BTS-22K	Integrator
R91	8200Ω	‡		BTS-8200	Integrator
R92	8200Ω	‡		BTS-8200	Integrator
R93	1.5 Meg.	‡		BTS-1.5 Meg.	Vert. Osc. Grid
R94	220KΩ	‡		BTS-220K	Vert. Osc. Plate
R95	100KΩ	‡		BTS-100K	Voltage Divider
R96	2.2 Meg.	‡		BTS-2.2 Meg.	Voltage Divider
R97	2.2 Meg.	‡		BTS-2.2 Meg.	Vert. Output Grid
R98	56KΩ	1		BTA-56K	Vert. Osc. Plate Decoupling
R99	8200Ω	‡		BTS-8200	Vert. Peaking
R100	1800Ω	‡		BTS-1800	Vert. Output Cathode
R101	10KΩ	1		BTA-10K	Vert. Output Plate Decoupling
R102	470KΩ	‡		BTS-470K	Horiz. Sync. Disc. Load
R103	470KΩ	‡		BTS-470K	Horiz. Sync. Disc. Load
R104	1 Meg.	‡		BTS-1 Meg.	Horiz. Sync. Disc. Load
R105	470KΩ	‡		BTS-470K	Horiz. AFC Filter Network
R106	56Ω	‡		BTS-560	Horiz. AFC Grid
R107	10Ω	‡		BW-½-10	Horiz. AFC Cathode
R108	27KΩ	1		BTA-27K	Voltage Divider
R109	39KΩ	1		BTA-39K	Horiz. AFC Screen
R110	47KΩ	1		BTA-47K	Horiz. AFC Plate
R111	39KΩ	1		BTA-39K	Horiz. AFC Plate
R112	27KΩ	1		BTS-27K	Horiz. Osc. Grid
R113	10KΩ	1		BTA-10K	Horiz. Osc. Screen
R114	5000Ω	5		AB-5000	Horiz. Osc. Plate (Wire Wound)
R115	6800Ω	‡		BTS-6800	Differentiator
R116	220KΩ	‡		BTS-220K	Horiz. Discharge Grid
R117	680KΩ 5%	‡		BTS-680K-5%	Horiz. Discharge Plate

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA REGAL PART No.	IRC PART No.	IDENTIFICATION CODES
R118	6800Ω	‡		BTS-6800	Horiz. Peaking See Note 1
R119	220KΩ	‡		BTS-220K	Horiz. Output Grid See Note 2
R120	100Ω	2		BW-2-100	Horiz. Output Cathode
R121	22KΩ	2		BT-2-22K	Horiz. Output Screen
R122	18KΩ	1		BTA-18K	Horiz. Output Screen
R123	5300Ω	20			Damper Filter, (Wire Wound) See Note 3
R124	1 Meg.	1			HV Filter See Note 3
R125	1800Ω	1		BTA-1800	Focus Coil Shunt See Note 3
R126	270Ω	2		BW-2-270	Focus Coil Shunt
R127A	1360Ω	17			Filter (Wire Wound)
B	230Ω	10			Bias Network (Wire Wound)
R128A	6750Ω	4			Bleeder (Wire Wound)
B	122	1			Bias Network (Wire Wound)
C	93Ω	4			Bias Network (Wire Wound)
R129	56Ω	1		BW-1-56	Ion Trap Coil Shunt See Note 1
R130	4.7Ω	‡			HV Rect. Filament (Wire Wound) See Note 5
R131	10KΩ	‡		BTS-10K	Mixer Grid Shunt
R132	150KΩ	‡		BTS-150K	Acc. Anode Dropping See Note 1
R133	27KΩ	‡		BTS-27K	Tone Compensation
R134	1 Meg.	‡		BTS-1 Meg.	Horiz. Discharge Plate See Note 4
R135	10KΩ	1		BTA-10K	Horiz. Output Screen See Note 4
R136	4.7Ω	‡			HV Rect. Filament, (Wire Wound) See Notes 4 & 5
R137	2 Meg.	‡			Current Limiting See Note 4
R138	500KΩ	1			HV Filter See Note 4
R139	2000Ω	2		BT-2-2200	Focus Coil Shunt See Note 4
R140	10KΩ	1		BTA-10K	Vert. Output Plate Decoupling See Note 1

Note 1. Not used in all models.
Note 2. Models 1030, 1031 and 1230 use 470KΩ resistor in this application.
Note 3. Not used in model 16T31.
Note 4. Used in model 16T31 only.
Note 5. Some models use 3.3Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA REGAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC ⑤ 2.5A	670VCT .300ADC	5VAC ⑤ 6A	5VAC ⑤ 2A SEC. 4 12.6VCT ⑤ 5.1A		P-8156 ④	P-3061	TP-365

④ Add series resistor to reduce plate voltage.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA REGAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	165Ω	1310Ω		A-8121	A-4000	TSO-1	Vert.Block Osc.Trans.
T3	590Ω	6.9Ω		A-8115	A-3035	TSO-1	Vert. Output Trans.
T4	37Ω CT	35Ω Tap. ⑤ 9.5Ω					Hor.Sync.Disc.Trans.
T5A	110Ω Tap ⑤ 70Ω	SEC. 1 7.7Ω Tap 3 .7Ω SEC.2,3 .2Ω		A-8119			Hor.Output Trans.③
B	42Ω Tap.④ 18Ω	SEC. 1 10.6Ω Tap. ⑤ .6Ω SEC. 2 .2Ω		A-8117		TFB-1	Hor.Output Trans.
T6A	47Ω						Focus Coil ③
B	247Ω			FC-10			Focus Coil
T7	33Ω	3Ω					Ion Trap ②
T8A	14Ω			DY-1			Hor.Deflection Coil
B	6Ω						Vert.Deflection Coil

② Some models use PM type ion trap.
③ Used in model 16T31.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA REGAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T9	7300Ω	3.2Ω	480Ω	.7Ω		A-3878	A-2931	RO-13	

SPEAKER

ITEM No.	RATINGS FIELD RES.	RATINGS V. C. IMP.	REPLACEMENT DATA REGAL PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	PM	3.2Ω			57A21	
SP2	CONE DIA. 4 7/8" x 7 1/8"	V. C. DIA. 9/16"				

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

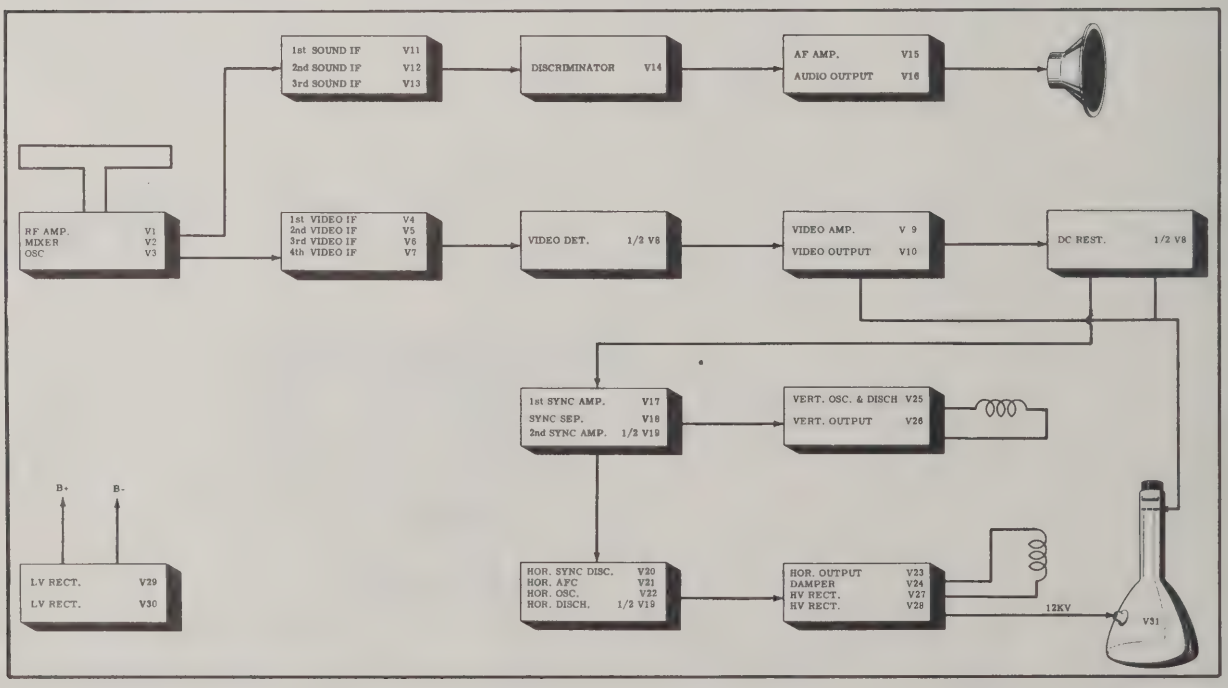
ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	REGAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.300A	50Ω	3 Henries		C-2326 ①	C-2991 ①	TR-3300 ①	① Drill new mounting holes.

COILS (RF-IF)

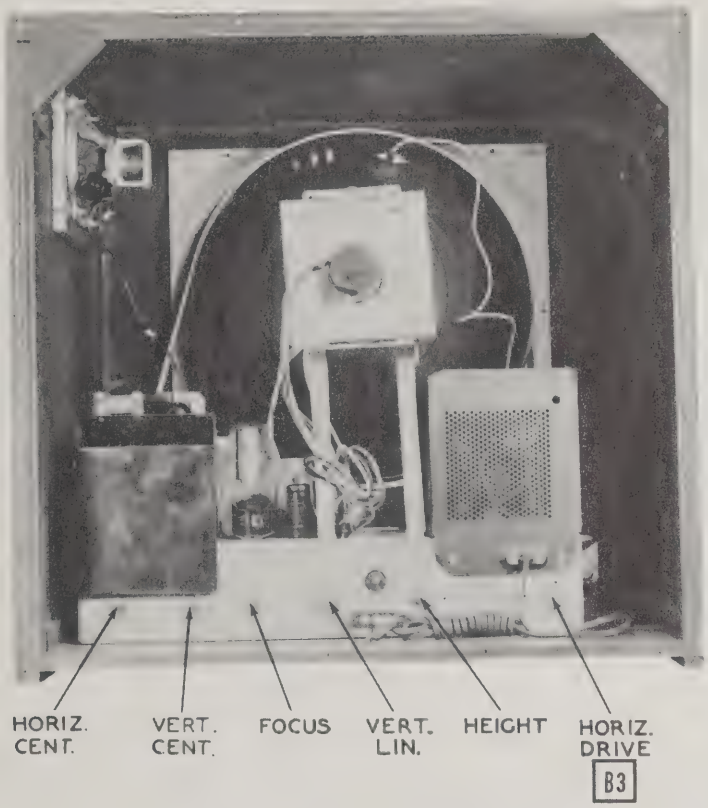
ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	REGAL PART No.	MEISSNER PART No.	
L2	Ant.Trans.	0Ω				
L3	Interference Trap	0Ω				
L4	Interference Trap	0Ω				
L5	Fil.Choke	0Ω				
L6	Mixer Grid	.1Ω				
L7	1st Video IF and Sound Trap	.2Ω				Part of tuner assembly.
L8	Fil.Choke	0Ω				
L9	2nd Video IF	.2Ω				
L10	Fil.Choke	0Ω				
L11	3rd Video IF	.2Ω				
L12	Fil.Choke	0Ω				
L13	4th Video IF	.2Ω				
L14	Sound Trap	.1Ω				
L15	Fil.Choke	0Ω				
L16	5th Video IF	.1Ω				
L17	Fil.Choke	0Ω				
L18	Peaking	6Ω				Wound on 39KΩ resistor, 180 microhenries
L19	Peaking	8Ω				250 microhenries
L20	Peaking	5Ω				Wound on 22KΩ resistor, 120 microhenries
L21	Peaking	4Ω				93 microhenries
L22	Peaking	5Ω				Wound on 22KΩ resistor, 120 microhenries
L23	Peaking	4Ω				93 microhenries
L24	1st Sound IF	.2Ω	0Ω			
L25	2nd Sound IF	.1Ω	0Ω			
L26	Disc.Trans.	0Ω	0Ω			
L27	Hor. Size	.6Ω				Where additional width is required, remove Hor. size coil and replace with .01-600W V capacitor.
L28	Hor. Linearity	37Ω				

MISCELLANEOUS

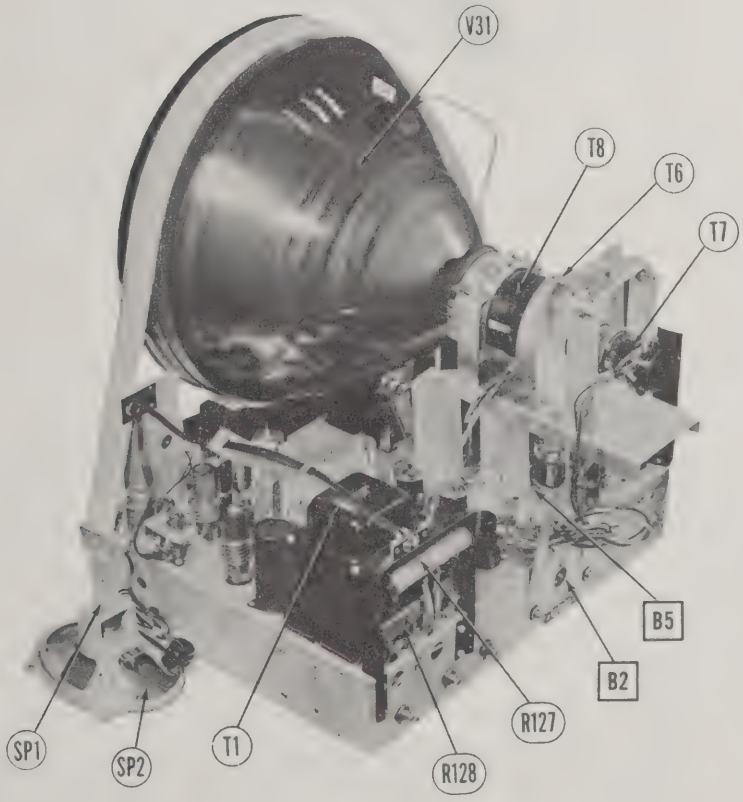
ITEM No.	PART NAME	REGAL PART No.	NOTES
M1	Fuse		Type 3AG .25A
M2	RF Tuner		



BLOCK DIAGRAM



CABINET-REAR VIEW



CHASSIS-TOP VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

HORIZONTAL OSCILLATOR ALIGNMENT CHECK:

The sync. link must be in the normal position (2 to 3). After turning the horizontal hold control to the maximum counter clockwise position, the picture should remain in horizontal sync. Remove the picture momentarily by turning the contrast control fully counter-clockwise and then return it to the normal operating position. This should pull the picture back into synchronization.

Now turn the horizontal hold control fully clockwise. The picture should remain in sync. Momentarily remove the signal and again the picture should pull into sync if receiver is functioning properly.

If the receiver functions properly under these checks, it is not necessary to align the horizontal oscillator circuit. However, if the picture is not normal or stable, the horizontal oscillator must be aligned.

SLIGHT RETOUCH ALIGNMENT:

If the receiver failed in the above check to hold sync. at either extreme of the hold control or after momentary removal of the signal, it may be possible to align the horizontal oscillator by making slight adjustments. If this fails, it will be necessary to completely re-align the horizontal oscillator circuit.

Tune in a TV station and adjust tuning for best sound quality. Sync the picture and adjust the contrast control to slightly less than normal position. Turn the horizontal hold control to the point where the horizontal oscillator fails to hold or pull in. Remove signal. Turn B2 frequency adjustment (located at rear of chassis) until oscillator pulls into sync. Now check the pull-in and hold for the other extreme of the horizontal hold control.

COMPLETE ALIGNMENT:

Tune in a TV station for the best sound quality. Adjust vertical hold control to vertically sync the picture and adjust the contrast control to slightly less than normal. Turn B2 frequency adjustment until picture syncs horizontally. If blanking bar is present on picture, adjust B1 (phasing adjust. screw) until blanking bar moves to the right and off the raster. If ripples occur in the raster turn B1 in a clockwise direction until the unstable condition is removed. The length of this adjustment screw in its correct position is usually about 1/2 inch beyond the bushing.

Turn horizontal hold control fully counter-clockwise and adjust B2 until picture fails to sync. Now slowly turn B2 to the point where the picture syncs again. Readjust B1 so that the left side of picture is close to the left side of the raster but does not fold over.

Turn horizontal hold fully clockwise. Right side of picture should be close to right side of raster but does not fold over. If picture does fold over, readjust B1.

When signal is restored after momentary removal of the signal, the picture should fall into sync. If picture fails to fall into sync, turn B2 counter-clockwise until picture syncs in.

Turn horizontal hold fully counter-clockwise. Picture should fall back into sync after momentary removal of signal.

If picture fails to pull in sync after momentary removals of the signal in both extremes of the horizontal hold control, there may not be a sufficient pull-in range, through not necessarily. A pull-in of 3/4 of the hold control range should be satisfactory.

Excessive pull-in is objectionable because high control circuit sensitivity gives greater reaction to noise pulses. This may also affect the vertical sync. and equalizing pulses which tend to cause a bend in the top portion of the raster.

This condition is more noticeable in the 1 to 2 position of the sync link.

HORIZONTAL LINEARITY ADJUSTMENTS:

Turn the horizontal drive trimmer (B3) clockwise as far as possible without crowding the right side of the picture. (Some models do not have this trimmer. In those models, it is replaced with a control marked "horizontal peaking"). This provides maximum voltage for the picture tube second anode. If the set has a horizontal width slug (B4) adjust it until the picture fills the mask horizontally. Adjust the horizontal linearity slug (B5) for best linearity of picture from left to right. (It may be necessary to slightly readjust B3).

If continued adjustment of the drive, width, and linearity adjustments fail to give proper linearity, it may be necessary to move the tap on R123 which is located in the high voltage power supply compartment; it will be necessary to repeat the entire procedure if this tap is changed.

SILVERTONE MODELS
8024, 8025 (Ch. 478.206-1)

SILVERTONE MODELS
8024, 8025 (Ch. 478.206-1)

SILVERTONE MODEL 8024

TRADE NAME	Silvertone, Models 8024, 8025 (Ch. 478.206-1)		
SUPPLIER	Sears, Roebuck and Co., 925 S. Homan St., Chicago, Illinois		
TYPE SET	AC Operated AM-FM Superheterodyne Receiver with Loop Antenna		
TUBES(EIGHT)	Types 6BJ6 FM RF Amp., 12AT7 FM Converter, 6BE6 AM Converter, 6BJ6 1st IF Amp., 6BA6 FM 2nd IF Amp., 6T8 DET-AVC-AF, 6AS5 Power Output, 6X4 Rectifier		
POWER SUPPLY	105-125 Volts AC	RATING	.34 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC	FREQ. MOD.	88-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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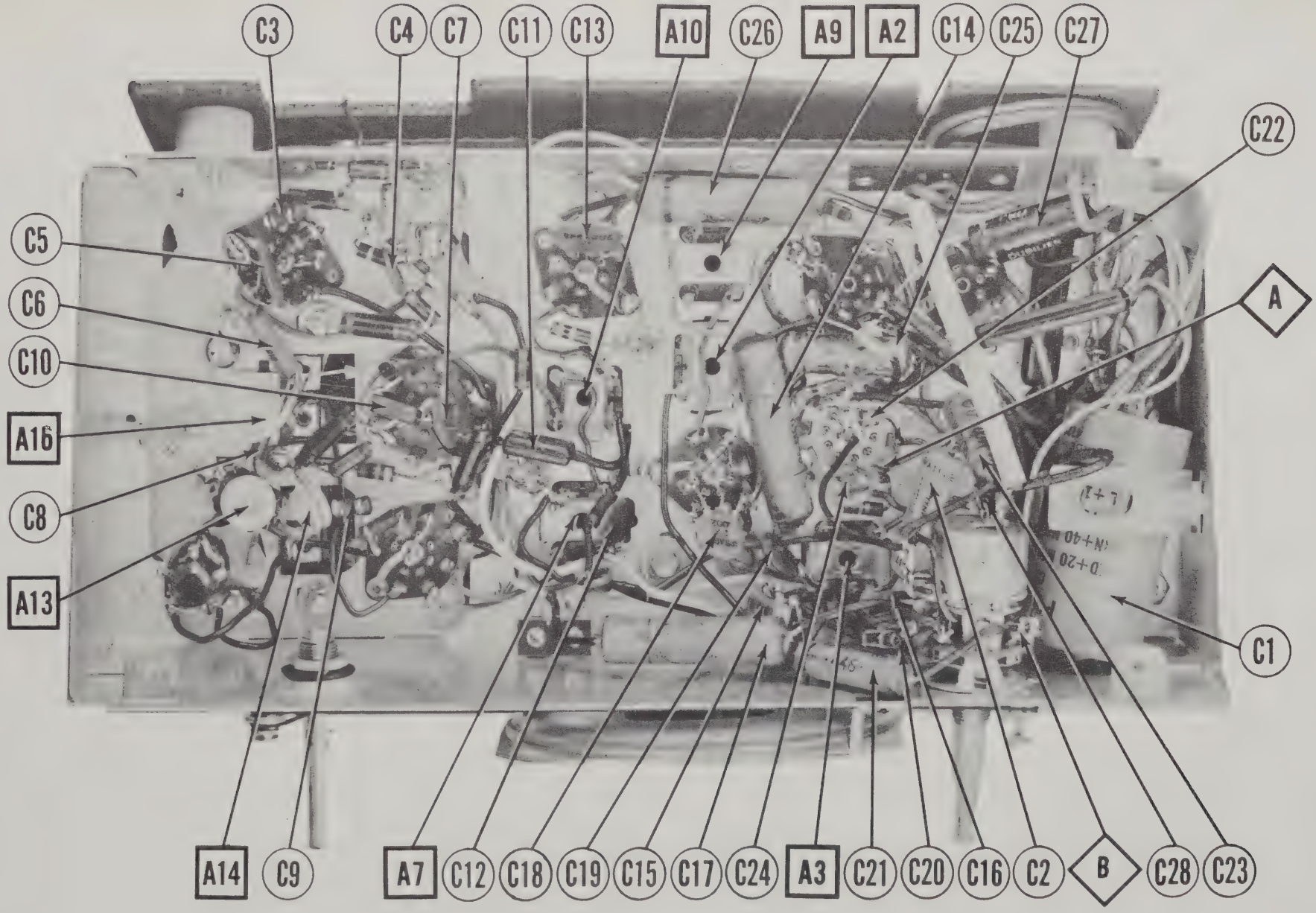
DATE 12/49 SET #80 FOLDER 15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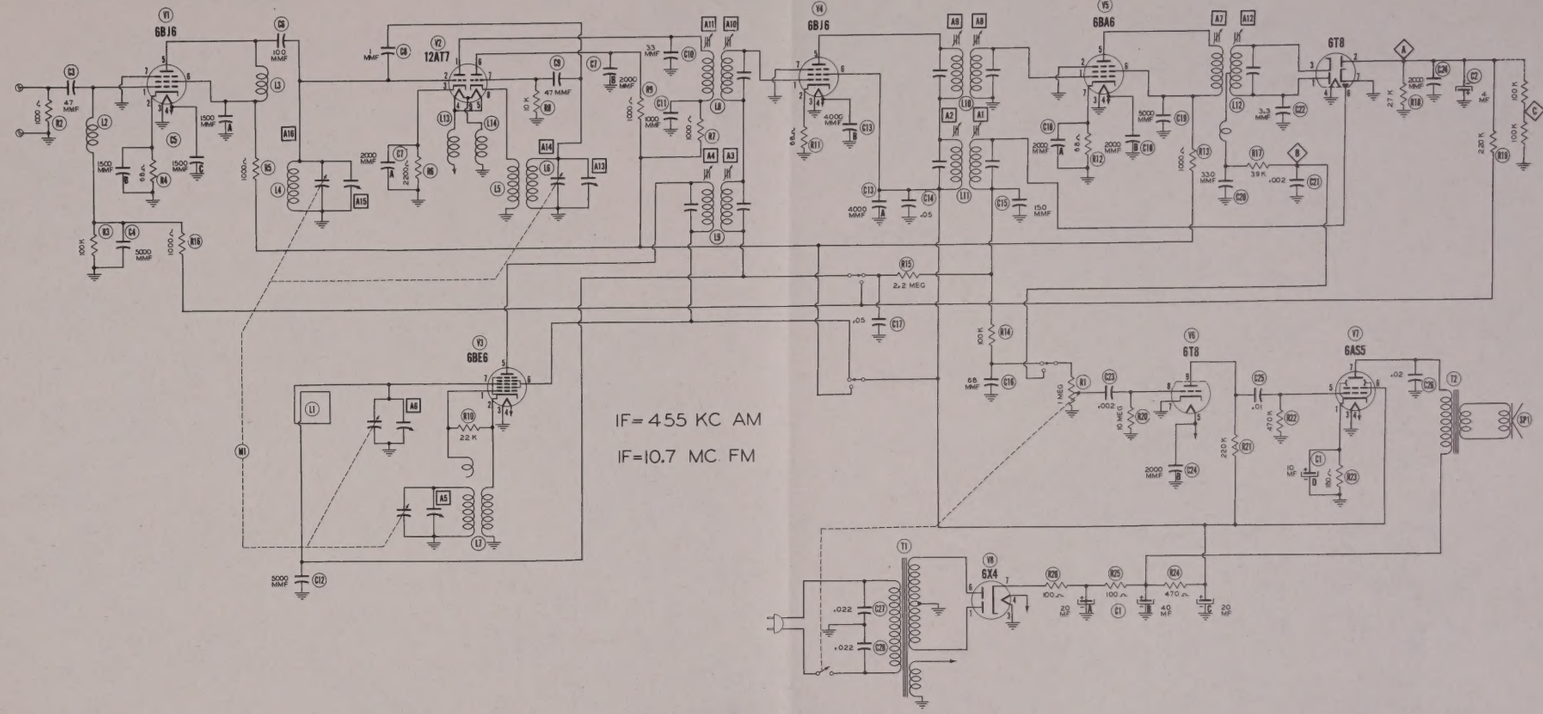
C28
C23



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
*	V1 6BJ6	0V	.9VDC	0V	6.3VAC	95VDC	95VDC	0V		
*	V2 12AT7	105VDC	0V	2.8VDC	6.3VAC	6.3VAC	105VDC	3.1VDC	0V	0V
	V3 6BE6	1.8VDC	0V	0V	6.3VAC	122VDC	122VDC	-.1VDC		
	V4 6BJ6	-.1VDC	.9VDC	0V	6.3VAC	122VDC	122VDC	0V		
*	V5 6BA6	0V	0V	0V	6.3VAC	92VDC	90VDC	.9VDC		
	V6A 6T8	-.3VDC	-.9VDC	-.4VDC	0V	6.3VAC	-.6VDC	0V	-.9VDC	62VDC
*	V6B 6T8	-.3VDC	-.9VDC	-.4VDC	0V	6.3VAC	-.6VDC	0V	-.6VDC	67VDC
	V7 6AS5	8VDC	0V	0V	6.3VAC	0V	122VDC	127VDC		
	V8 6X4	160VAC	0V	0V	6.3VAC	0V	160VAC	160VDC		

TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
*	V1 6BJ6	100KΩ	68Ω	0Ω	.1Ω	11.7KΩ	11.7KΩ	0Ω		
*	V2 12AT7	11.7KΩ	.8Ω	2.2KΩ	.8Ω	.8Ω	11.7KΩ	10KΩ	0Ω	.1Ω
	V3 6BE6	22ΚΩ	.3Ω	0Ω	.1Ω	165ΚΩ	165ΚΩ	2.3Meg.		
	V4 6BJ6	2.3Meg.	68Ω	0Ω	.1Ω	165ΚΩ	165ΚΩ	0Ω		
*	V5 6BA6	.8Ω	0Ω	0Ω	.1Ω	11.7KΩ	11.7KΩ	68Ω		
	V6A 6T8	Inf.	27ΚΩ	Inf.	0Ω	.1Ω	1 Meg.	0Ω	1Ω Meg.	120ΚΩ
*	V6B 6T8	1 Meg.	27ΚΩ	1 Meg.	0Ω	.1Ω	Inf.	0Ω	1Ω Meg.	120ΚΩ
	V7 6AS5	180Ω	470ΚΩ	0Ω	.1Ω	470ΚΩ	165ΚΩ	126ΚΩ		
	V8 6X4	88Ω	Inf.	0Ω	.1Ω	Inf.	88Ω	10ΚΩ		

* VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.
† Measured from pin 7 of V8

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning gang fully closed and set the pointer 1-3/32" to the right of the center of the volume control shaft.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to stator of AM ant. section of tuning gang. Low side to chassis.	455KC (400∿ Mod.)	AM (counter clock-wise)	Tuning gang fully open	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	"	Tune for max. output	"	A6	"
4.		Loop	600KC	"	"	"		Reinstall set in cabinet. and check to see if pointer is at 600KC. If necessary bend the end plates on the oscillator section of the tuning for proper tracking. If plates are changed repeat steps 2 and 4. Bend end plates of antenna for maximum output.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	10.7MC (450KC Sweep)	FM (clock-wise)	Point of non interference	Vert.Amp. to Point (A). Low side to chassis.	A7,A8, A9,A10 A11	Disconnect stabilizer capacitor C2. Adjust for maximum amplitude and symmetry as per Fig. 1.
6.	.01MFD	"	"	"	"	Vert.Amp. to Point (B). Low side to chassis.	A12,A7	Reconnect capacitor C2. Adjust A12 so 10.7MC occurs at center of crossover lines as per Fig 2. Slightly retouch A7 for maximum amplitude and straightness of cross over lines. Continue with step 8.

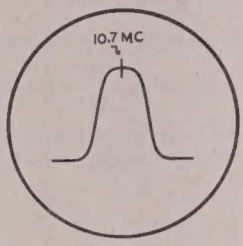


FIG. 1

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 1%) resistors in series from Point (A) to B-. The junction of these two resistors is alignment Point (C) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to pin 1 (Grid) of 6BA6 (V5). Low side to chassis.	10.7MC (Unmod.)	FM (clock-wise)	Tuning gang fully open	DC Probe to Point (A) Common to chassis.	A7	Adjust for maximum deflection.
6.	.01MFD	"	"	"	"	DC Probe to Point (B) Common to Point (C).	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
7.	.01MFD	High side to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	"	"	"	DC Probe to Point (A) Common side to chassis.	A8,A9, A10, A11	Adjust for maximum deflection.

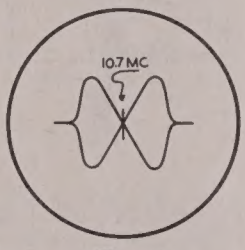


FIG. 2

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω carbon res.	High side to ungrounded FM ant. terminal. Low side to chassis.	109MC (Unmod.)	FM	Tuning gang fully open	DC Probe to Point (A) Common to chassis.	A13	Adjust for maximum deflection.
9.	"	"	87.5MC	"	Tuning gang fully closed	"	A14	Expand or compress coil turns for maximum deflection. Repeat steps 8 and 9 until no further improvement can be made.
10.	"	"	106MC	"	106MC	"	A15	Adjust for maximum deflection.
11.	"	"	90MC	"	90MC	"	A16	Expand or compress coil turns for maximum deflection. Repeat steps 10 and 11 until no further improvement can be made.

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	SILVERTONE PART No.	IRC PART No.	
R2	1000Ω	½	RC-102-1	BTS-1000	Ant. Loading
R3	100KΩ	½	RC-104-1	BTS-100K	FM RF Grid
R4	68Ω	½	RC-680-2		FM RF Cathode
R5	1000Ω	½	RC-102-1	BTS-1000	FM RF Decoupling
R6	2200Ω	½	RC-222-2	BTS-2200	FM Conv. Cathode
R7	1000Ω	½	RC-102-1	BTS-1000	FM Conv. Plate Decoupling
R8	10KΩ	½	RC-103-2	BTS-10K	FM Osc. Grid
R9	1000Ω	½	RC-102-1	BTS-1000	FM Osc. Plate
R10	22KΩ	½	RC-223-1	BTS-22K	AM Osc. Grid
R11	68Ω	½	RC-680-2		1st IF Cathode
R12	68Ω	½	RC-680-2		2nd FM IF Cathode
R13	1000Ω	½	RC-102-1	BTS-1000	2nd FM IF Decoupling
R14	100KΩ	½	RC-104-1	BTS-100K	Diode Filter
R15	2.2 Meg.	½	RC-225-1	BTS-2.2 Meg.	AVC Network
R16	1000Ω	½	RC-102-1	BTS-1000	AVC Network
R17	39KΩ	½	RC-393-2	BTS-39K	De-emphasis
R18	27KΩ 5%	½	RC-273-3	BTS-27K-5%	Ratio Det. Diode Load
R19	220KΩ	½	RC-224-1	BTS-220K	AVC Network See Note
R20	10 Meg.	½	RC-106-1	BTS-10 Meg.	AF Grid
R21	220KΩ	½	RC-224-1	BTS-220K	AF Plate
R22	470KΩ	½	RC-474-1	BTS-470K	Output Grid
R23	180Ω	½	RC-181-2	BW-½-180	Output Cathode
R24	470Ω	2	RW-471-8	BW-2-470	Filter (Wire Wound)
R25	100Ω	2	RW-101-8	BW-2-100	Filter (Wire Wound)
R26	100Ω	2	RW-101-8		Surge Limiter (Wire Wound)

Note. Not used in all models.

TRANSFORMER (POWER)

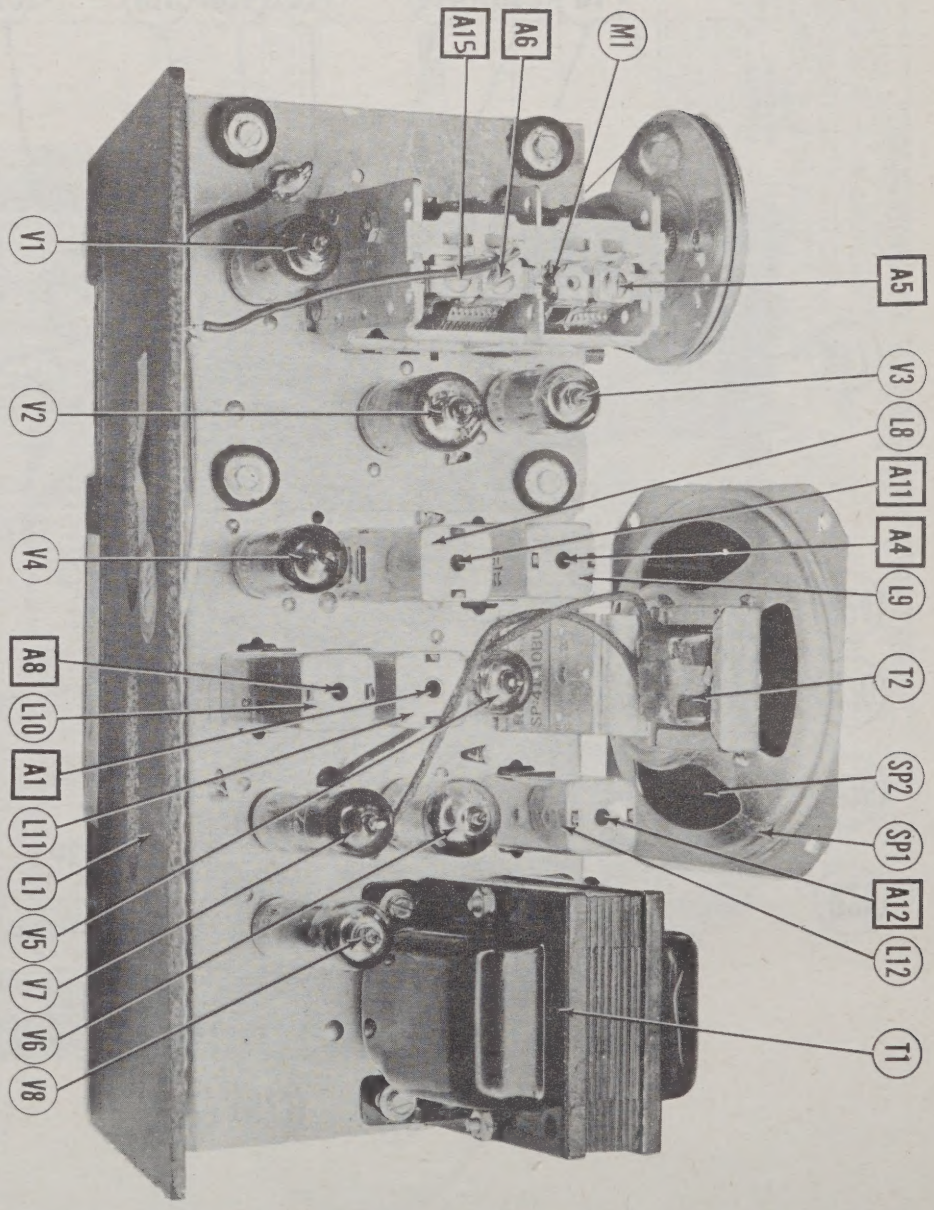
ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	SILVERTONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .34A	300VCT .061ADC	6.3VAC @ 3.1A		TR-21	P-6348 #		

Add series resistor to reduce plate voltage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SILVERTONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	2600Ω	3.4Ω	190Ω	.5Ω	Part of SP41-10B	A-3332 §	A-3025 §	RO-1A §	§ Bend mounting tabs down and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V. C. IMP.	SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	3.4Ω	SP41-10B	ST-113 † MOD.P4-X	4A07 †	† Remount output transformer.
	CONE DIA.	V. C. DIA.				
SP2	3 7/8"	9/16"				

CHASSIS—TOP VIEW